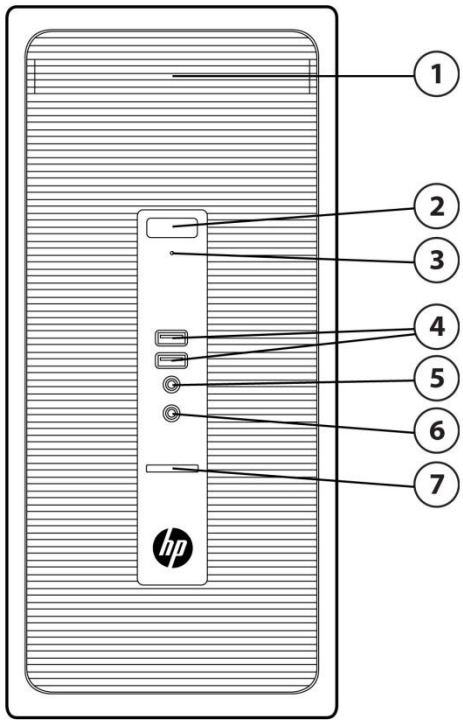
Overview

HP ProDesk 405 G2 Microtower Business PC



1. Slimline Drive bay supporting an optical disk drive (optional)
2. Power button
3. Hard Drive Activity Light
4. (2) USB 3.0 ports (blue)
5. 3.5mm microphone jack
6. 3.5mm headphone output
7. SD Reader

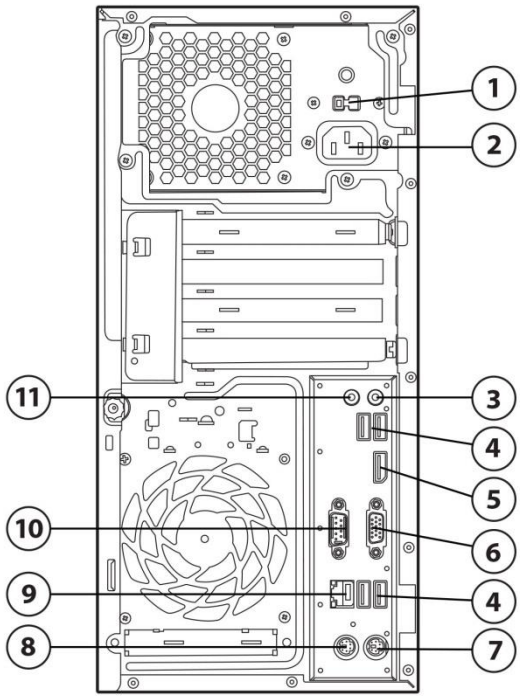
Not Shown

Slots (1) PCI 3.0 Express x16 graphics connectors
(3) PCI Express 2.0 x1 accessory connectors

Bays (2) 3.5" internal storage drive bays (1 bay can be configured as 2.5")

* Only 2 drives can be configured at the same time: 2 internal storage or 1 internal storage + 1 ODD

Overview



1. Voltage Select Switch (included on some models only)
2. Power Cord Connector
3. Line-Out Connector for powered audio devices (green)
4. (4) USB 2.0 Ports (black)
5. DisplayPort 1.2 Monitor Connector
6. VGA Monitor Connector
7. PS/2 Keyboard Connector (purple)
8. PS/2 Mouse Connector (green)
9. RJ-45 Network Connector
10. RS-232 Serial Connector
11. Line-In Audio Connector (blue)

Not Shown

Parallel Port (optional); 2nd RS-232 Serial Port (optional)

Overview

AT A GLANCE

- Redesigned expandable, upgradable Microtower chassis
- HP developed and engineered UEFI BIOS supporting security, manageability and software image stability
- AMD Radeon™ R5 Discrete-Class Graphics (with AMD Quad-Core A8 APU)
- AMD Radeon™ R3Discrete-Class Graphics (with AMD Quad-core A4 APU)
- AMD Radeon™ R2 Discrete-Class Graphics (with AMD Dual-core E1 APU)
- Discrete graphics options available
- Realtek RTL8151GH-CG GbE LOM integrated network connection
- Up to 16GB DDR3 Synchronous Dynamic Random Access Memory (SDRAM)
- Multi-independent monitor support via VGA and DisplayPort 1.2 video interfaces
- DTS Sound+ audio management software
- Standard and high efficiency energy saving power supply options
- ENERGY STAR® qualified models certified and EPEAT® Gold

NOTE: See important legal disclosures for all listed specs in their respective features sections.

Standard Features and Configurable Components

OPERATING SYSTEMS

Preinstalled When Purchased

Windows 8.1 Pro (64-bit)*
Windows 8.1 (64-bit)*
Windows 7 Professional (32-bit)*
Windows 7 Professional (64-bit)*
Windows 7 Professional (32-bit) (available through downgrade rights from Windows 8.1 Pro)**
Windows 7 Professional (64-bit) (available through downgrade rights from Windows 8.1 Pro)**
FreeDOS 2.0
Ubuntu Linux

*Not all features are available in all editions or versions of Windows. Systems may require upgraded and/or separately purchased hardware, drivers and/or software to take full advantage of Windows functionality. See http://www.microsoft.com.

**This system is preinstalled with Windows 7 Professional software and also comes with a license and media for Windows 8.1 Pro software. You may only use one version of the Windows software at a time. Switching between versions will require you to uninstall one version and install the other version. You must back up all data (files, photos, etc.) before uninstalling and installing operating systems to avoid loss of your data.

PROCESSORS

AMD Quad-Core A8 APU with AMD Radeon™ HD Graphics*

AMD Quad-Core A8-6410 Accelerated Processor with AMD Radeon™ R5 Discrete-Class Graphics (2.0GHz 2MB L2 cache, 25W)

AMD Quad-Core A4 APU with AMD Radeon™ HD Graphics*

AMD Quad-Core A4-6250 Accelerated Processor with AMD Radeon™ R3 Discrete-Class Graphics (2.0GHz 2MB L2 cache, 25W)

AMD Dual-Core E1 APU with AMD Radeon™ HD Graphics*

AMD Dual-Core E1-6050 Accelerated Processor with AMD Radeon™ R2 Discrete-Class Graphics (2.0GHz 1MB L2 cache, 25W)

*Multi-Core is designed to improve performance of certain software products. Not all customers or software applications will necessarily benefit from use of this technology. 64-bit computing system required. Performance will vary depending on your hardware and software configurations. AMD's numbering is not a measurement of higher performance.

GRAPHICS

AMD Radeon HD Graphics (integrated on processor)

- Integrated AMD Radeon R5, R3, R2 Graphics depending on processor

Discrete graphics (sold separately or as an optional feature

AMD Radeon HD 8350 (1GB) FH PCIe x16 *
AMD Radeon HD 8350 (1GB) PCIe x16 DH
AMD Radeon HD 8470 (2GB) FH *
AMD Radeon HD 8490 DP (1GB) PCIe x16
NVIDIA GeForce GT630 DP(2GB) PCIe x16**
NVIDIA NVS 310 512MB 1st
NVIDIA NVS 315 1GB PCIe x16
AMD Radeon R7 240 2GB FH PCIe x16***
AMD Radeon R9 255 2GB PCIe x16***

*Available only in China region
**Not configurable with 180W PSU
***Projected availability, October 2014

ADAPTERS AND CABLES

HP DMS-59 to Dual DisplayPort Cable
HP DMS-59 to Dual DVI Cable
HP DMS-59 to Dual VGA Cable
HP DisplayPort to DisplayPort Cable
HP DisplayPort to DVI-D Adapter
HP DisplayPort to HDMI Adapter
HP DisplayPort To HDMI 1.4 Adapter
HP DisplayPort to VGA Adapter
HP Serial Port Adapter
HP Parallel Port Adapter
HP DisplayPort Cable

STORAGE*

SATA Drives

2 TB, 7200 RPM, SATA 6.0 Gb/s, SMART IV, 3.5”
2 TB, 7200 RPM, SATA 6.0 Gb/s, SMART IV, 3.5” - 2nd hard drive
1 TB, 7200 RPM, SATA 6.0 Gb/s, SMART IV, 3.5”
1 TB, 7200 RPM, SATA 6.0 Gb/s, SMART IV, 3.5” - 2nd hard drive
500 GB, 7200 RPM, SATA 6.0 Gb/s, SMART IV, 3.5”
500 GB, 7200 RPM, SATA 6.0 Gb/s, SMART IV, 3.5” - 2nd hard drive
500GB, 7200 RPM SATA SED, 2.5” (with 3.5” adapter when installed in MT)
500GB, 7200 RPM SATA SED, 2.5” (with 3.5” adapter when installed in MT) - 2nd hard drive

Hybrid Drives

1 TB SATA 6G 2.5” (8 GB cache) SSHD Drive (with 3.5” adapter when installed in MT)
1 TB SATA 6G 2.5” (8 GB cache) SSHD Drive (with 3.5” adapter when installed in MT) - 2nd hard drive
500 GB SATA 6G 2.5” (8GB cache) SSHD Drive (with 3.5” adapter when installed in MT)
500 GB SATA 6G 2.5” (8GB cache) SSHD Drive (with 3.5” adapter when installed in MT) - 2nd hard drive
500 GB SATA 6G 2.5” (8GB cache) SSHD Drive w/caddy
500 GB SATA 6G 2.5” (8GB cache) SSHD Drive w/caddy- 2nd hard drive

Solid State Drives

120GB SATA 2.5 Non-SED SSD (with 3.5” adapter when needed)
180GB SATA 2.5 Non-SED SSD (with 3.5” adapter when needed)
128 GB SATA 6G 2.5” SSD (with 3.5” adapter when installed in MT)
128 GB SATA 6G 2.5” SSD (with 3.5” adapter when installed in MT) - 2nd hard drive

Standard Features and Configurable Components

128 GB SATA 6G 2.5" SSD w/caddy
128 GB SATA 6G 2.5" SSD w/caddy - 2nd hard drive
128GB SATA 2.5 SSD TLC Non-SED
256GB SATA 2.5 SSD TLC Non-SED

Self-encrypting Drives
500GB 7200 RPM SATA 2.5 SED HDD

Self-encrypting Solid State Drives
500GB 2.5" FIPS 140-2 Self-Encrypting (SED) Solid State Drive
500GB 2.5" FIPS 140-2 Self-Encrypting (SED) Solid State Drive - 2nd hard drive
500GB 2.5" FIPS 140-2 w/ca Self-Encrypting (SED) Solid State Drive
500GB 2.5" FIPS 140-2 w/ca Self-Encrypting (SED) Solid State Drive - 2nd hard drive
256GB SATA 2.5" Opal2 Self-Encrypting (SED) Solid State Drive SSD
256GB SATA 2.5" Opal2 Self-Encrypting (SED) Solid State Drive - 2nd hard drive
256GB SATA 2.5" w/ca Opal2 Self-Encrypting (SED) Solid State Drive
256GB SATA 2.5" w/ca Opal2 Self-Encrypting (SED) Solid State Drive - 2nd hard drive
256 GB SATA 2.5" Self-Encrypting (SED) Solid State Drive (with 3.5" adapter when installed in MT)
256 GB SATA 2.5" Self-Encrypting (SED) Solid State Drive (with 3.5" adapter when installed in MT) - 2nd hard drive
256 GB SATA 2.5" w/caddy Self-Encrypting (SED) Solid State Drive
256 GB SATA 2.5" w/caddy Self-Encrypting (SED) Solid State Drive - 2nd hard drive
180GB SATA 2.5" Opal1 Self-Encrypting (SED) Solid State Drive (Pro 1500)
180GB SATA 2.5" Opal1 Self-Encrypting (SED) Solid State Drive (Pro 1500) - 2nd hard drive
180GB SATA 2.5" Opal1 Self-Encrypting (SED) Solid State Drive (Pro 1500) w/caddy
180GB SATA 2.5" Opal1 Self-Encrypting (SED) Solid State Drive (Pro 1500) w/caddy - 2nd hard drive
128GB SATA 2.5" Opal2 Self-Encrypting (SED) Solid State Drive
128GB SATA 2.5" Opal2 Self-Encrypting (SED) Solid State Drive- 2nd hard drive
128GB SATA 2.5" Opal2 Self-Encrypting (SED) Solid State Drive w/ caddy
128GB SATA 2.5" Opal2 Self-Encrypting (SED) Solid State Drive w/ caddy - 2nd hard drive
120GB SATA 2.5" Opal1 Self-Encrypting (SED) Solid State Drive (Pro 1500)
120GB SATA 2.5" Opal1 Self-Encrypting (SED) Solid State Drive (Pro 1500) - 2nd hard drive
120GB SATA 2.5" Opal1 Self-Encrypting (SED) Solid State Drive (Pro 1500) w/ caddy
120GB SATA 2.5" Opal1 Self-Encrypting (SED) Solid State Drive (Pro 1500) w/ caddy - 2nd hard drive
120GB SATA 2.5 Opal2 SED SSD (with 3.5" adapter when needed)
180GB SATA 2.5 Opal2 SED SSD (with 3.5" adapter when needed)

10K 6 Gb/s Hard Drives
1TB 10K RPM 6G 3.5" Hard Drive
1TB 10K RPM 6G 3.5" Hard Drive - 2nd hard drive
500GB 10K RPM 6G 3.5" Hard Drive
500GB 10K RPM 6G 3.5 Hard Drive - 2nd hard drive

Frame/Carrier
HP Slim Removable SATA HDD Frame/Carrier

Optical Disc Drives

Slim DVD-ROM

Slim BDXL Blu-ray Writer

Slim SuperMulti

Media Card Reader**

SD Media Card Reader

*For hard drives and solid state drives, GB = 1 billion bytes. Actual formatted capacity is less. Up to 16 GB (for Windows 7) and 30 GB (for Windows 8.1) of system disk is reserved for the system recovery software.

**Card sold separately

MEMORY*

Form Factor	Type	Maximum	# of Slots
Microtower	DDR3 non-ECC Up to 1600 MT/s	16 GB	2 DIMM

* Full availability of 4 GB or more of memory requires a 64-bit operating system. With Windows 32-bit operating systems, the amount of usable memory is dependent upon your configuration, so that above 3 GB all memory may not be available due to system resource requirements.

Memory modules support data transfer rates up to 1600 MT/s; actual data rate is determined by the system's configured processor. See processor specifications for supported memory data rate.

NETWORKING/COMMUNICATIONS

Ethernet (RJ-45)

Realtek RTL8151GH-CG GbE LOM (standard)

Intel Ethernet I210-T1 PCIe x1 Gb Network Interface Card (optional)

Wireless*

Intel® Dual Band Wireless-N 7260 802.11 a/b/g/n PCI Express (optional)

HP WLAN 802.11 a/b/g/n 2x2 Dual Band PCIe x1 WLAN/Bluetooth® Card (optional)

Intel 7260 802.11 a/b/g/n PCIe x1 WLAN Card (optional)

* Wireless access point and Internet service required and not included. Availability of public wireless access points limited.

AUDIO/MULTIMEDIA

HD audio with Realtek ALC221 codec (all ports are stereo)

DTS Sound+ audio management technology

Microphone and headphone front ports (3.5mm)

Line-out and Line-In rear Ports (3.5mm)

Multi-streaming capable

Internal speaker (standard)

KEYBOARDS AND POINTING DEVICES

Keyboard

HP PS/2 Keyboard
HP USB Keyboard
USB Smart Card (CCID) Keyboard
HP USB and PS/2 Washable Keyboard
HP Wireless Keyboard and Mouse Combo*
HP USB Antimicrobial Keyboard
*Keyboard contains 25% post-consumer recycled plastic material

Mice

HP PS/2 Mouse
HP USB Mouse
HP USB 1000dpi Laser Mouse
HP USB and PS/2 Washable Mouse
HP USB Antimicrobial Mouse

HP BIOSphere

Standard Features and Configurable Components

Key features of the HP BIOS include:

- Deployment and manageability - HP BIOS provides several technologies that help integrate the HP ProDesk 405 G2 MT Business PC into the enterprise, such as PXE, and F10 Setup support for 12 languages.
- Support UEFI specification 2.3.1
- Thermal and power management - The HP BIOS provides and enables thermal and power management technologies so component temperatures are managed for high reliability and to assist in operating the HP Business Desktop computer in any enterprise environment.
- Thermal Controlled Fans – Automatic or manual controlled fan speeds for cooling and acoustic performance Serviceability - HP BIOS provides diagnostic and detailed service information.
- Upgrades and recovery - HP BIOS provides numerous ways to upgrade HP Business Desktop computers, including BIOS updates from within DOS (DOSFlash), BIOS updates from within Windows (HPQFlash), HP Client Manager, and fail-safe recovery (Emergency Boot Block Recovery).
- HP BIOS uses PKI signing of the BIOS for trusted BIOS upgrades and recovery.
- Serviceability - HP BIOS provides diagnostic and detailed service information.

Additional HP BIOS Features:

- Power-On password - Helps prevent an unauthorized user from powering on the system.
- Administrator password - Also known as the setup password, this helps prevent unauthorized changes to the system configuration. If the administrator password is not known, the BIOS version cannot be changed and changes cannot be made to BIOS settings using F10 setup or under the OS.
- Advanced Configuration and Power Interface (ACPI) - Represents a significant innovation in power and configuration management, allowing operating systems and applications to manage power based on activity and usage. HP Pro models use ACPI to provide power conservation features.
- S5 Max Power Savings setting supports EU Lot6 requirement and allows the computer to power down below 1W is S5 (when turned off). When S5 Max Power Savings feature is enabled power to slots is turned off along with WOL functionality.
- HP BIOS Protection – prevents unauthorized updates or changes to the BIOS due to malware, viruses, or malicious BIOS updates. Based on NIST SP800-147 policy guidelines.

MANAGEABILITY

Fully manageable and supported by industry-standard HP Client Management Solutions. Optional LANDesk management tools simplify mobile device management and security. Simplify everything from deployment or migration to daily management, security, licensing, and more—and stop downtime before it starts.

- Hardware Management: Inventory, Device config and BIOS updates, HW alerting, Driver updates
- Software Management: Deployment, App Management, Patch Management; Deployment and Migration; Proactive HW and SW Management; Mobile Users and Device Management; Remote Assistance / Help Desk
- LANDesk Management Suite 9.5 (LDMS) – optional – contact HP representative for part numbers
- Hardware integration with Microsoft System Center Configuration Manager: Client Integration Kit (CIK), Client Catalog, Client Driver Packs
- HP SoftPaq Download Manager (SDM)
- HP System Software Manager (SSM)
- HP BIOS Configuration Utility (BCU)
- HP Driver Packs
- HP Client Management Interface (HP CMI)
- Absolute Persistence Software*

Standard Features and Configurable Components

*BIOS Absolute Persistence module is shipped turned off, and will be activated when customers purchase and activate a subscription. Service may be limited. Check with Absolute for availability outside the U.S. The optional subscription service of Absolute Recovery Guarantee is a limited warranty. Certain conditions apply. For full details visit: http://www.absolute.com/company/legal/agreements/computrace-agreement. If Data Delete is utilized, the Recovery Guarantee payment is null and void. In order to use the Data Delete service, customers must first sign a Pre-Authorization Agreement and either create a PIN or purchase one or more RSA SecurID tokens from Absolute Software.

SECURITY

Trusted Platform Module,SLB9660TT1.2FW4.40 (TPM) 1.2 (Common Criteria EAL4+ certified)	**X**
SATA port disablement (via BIOS)	**X**
Drivelock	**N/A**
RAID configurations	**N/A**
Serial, parallel, USB enable/disable (via BIOS)	**X**
Optional USB Port Disable at factory (user configurable via BIOS)	**X**
Removable media write/boot control	**X**
Power-On password (via BIOS)	**X**
Administrator password (via BIOS)	**X**
HP Chassis (1 bay) Security Kit	**N/A**
Solenoid Hood Lock / Sensor	**N/A**
Support for chassis padlocks and cable lock devices	**X**

ENVIRONMENTAL & REGULATORY

ENERGY STAR® qualified models available

EPEAT® registered where applicable/supported. EPEAT registration varies by country. See www.epeat.net for registration status by country.

Low halogen (chassis, all internal components and modules)*

TAA compliant

For accessibility information on HP products, please visit: http://www.hp.com/accessibility.

*External power supplies, power cords, cables and peripherals are not Low Halogen. Service parts obtained after purchase may not be Low Halogen.

PORTS

I/O Ports – Standard

USB 2.0	4 (rear)
USB 3.0	2 (front)
Serial (RS-232)	1
PS/2	1 keyboard (purple), 1 mouse (green)
Video	1 VGA, 1 DisplayPort 1.2
Audio	Front: headphone/mic Rear: line in/out 3.5mm diameter
RJ-45 Network Interface	1

I/O Ports – Optional

Standard Features and Configurable Components

2nd Serial (RS-232)	1
Parallel	1
PCI Express x1 (v2.0)	3 4.2” full height 6.6” length 10W max. power
PCI Express x16 (v2.0)	1 4.2” full height 6.6” length 75W max. power

BAYS

(4 total – 2 external, 2 internal)

External, SD reader	1
External, Slimline ODD	1
Internal 3.5” storage drive*	2

*One bay can be configured as a 2.5”

** Only 2 drives can be configured at the same time: 2 internal storage or 1 internal storage + 1 ODD

SERVICE AND SUPPORT

On-site Warranty [1]: One-year (1-1-1) limited warranty delivers one year of on-site, next business day [2] service for parts and labor and includes free telephone support [3] 24 x 7. One-year onsite and labor are not available in all countries. Service offers terms up to 5 years by choosing a Care Pack. To choose the right level of service for your HP product, visit HP Care Pack Central: www.hp.com/go/cpc

NOTE 1: Terms and conditions may vary by country. Certain restrictions and exclusions apply. Other warranty variations may be offered in your region.

NOTE 2: On-site service may be provided pursuant to a service contract between HP and an authorized HP third-party provider, and is not available in certain countries. Global service response times are based on commercially reasonable best effort and may vary by country.

NOTE 3: Technical telephone support applies only to HP-configured and third-party HP qualified hardware and software. Toll-free calling and 24 x 7 support may not be available in some countries.

Standard Features and Configurable Components

OPERATING SYSTEMS

Preinstalled

Windows 8.1 Pro (64-bit)*
Windows 8.1 (64-bit)*
Windows 7 Professional (32-bit)*
Windows 7 Professional (64-bit)*
Windows 7 Professional (32-bit) (available through downgrade rights from Windows 8.1 Pro)**
Windows 7 Professional (64-bit) (available through downgrade rights from Windows 8.1 Pro)**
FreeDOS 2.0
Ubuntu Linux

For all Preinstalled operating systems HP provides Microsoft WHQL certified (where applicable) drivers on www.hp.com at the time of product announcement.

Web Support Windows 7 Enterprise (32-bit or 64-bit)

For all Supported operating systems HP performs testing of the OS, and makes available all HP value add software (OS dependent). Certified drivers are made available on www.hp.com within 30 days of product announcement.

* Not all features are available in all editions or versions of Windows. Systems may require upgraded and/or separately purchased hardware, drivers and/or software to take full advantage of Windows functionality. See http://www.microsoft.com.

**This system is preinstalled with Windows® 7 Professional software and also comes with a license and media for Windows 8.1 Pro software. You may only use one version of the Windows software at a time. Switching between versions will require you to uninstall one version and install the other version. You must back up all data (files, photos, etc.) before uninstalling and installing operating systems to avoid loss of your data.

SOFTWARE COMPONENTS AND APPLICATIONS WITH WINDOWS

Included	Windows 7	Windows 8.1
Security	HP Client Security[9] HP Drive Encryption (FIPS 140-2)[1] HP Device Access Manager with Just In Time Authentication HP Password Manager HP File Sanitizer (SSDs and Hybrid Drives not supported)[5] HP Disk Sanitizer External Edition[2,4] Microsoft Security Essentials (Windows 7)[10]	Disk Sanitizer External Edition[2, 4] Microsoft Defender[7]
MultiMedia	Cyberlink Power DVD, BD Cyberlink Power2Go (Secure Burn)	Cyberlink Power DVD, BD Cyberlink Power2Go (Secure Burn)
Communication		HP Wireless Hotspot[8]
HP Value Add	HP ePrint Driver[3] HP PageLift[11] HP Recovery Manager HP Support Assistant HP Recovery Disk Creator	HP ePrint Driver[3] HP PageLift[11] HP Recovery Manager HP Support Assistant
3rd Party	Box 50 GB Offer[6] Foxit PhantomPDF Express Skype	Box Application Foxit PhantomPDF Express Skype

Standard Features and Configurable Components

Microsoft Products	Buy Office	Buy Office

1. Drive Encryption requires Windows. Data is protected prior to Drive Encryption login. Turning the PC off or into hibernate logs out of Drive Encryption and prevents data access.
2. Available via download
3. Requires an Internet connection to HP web-enabled printer and HP ePrint account registration (for a list of eligible printers, supported documents and image types and other HP ePrint details, see www.hp.com/go/eprintcenter).Requires optional broadband module. Broadband use requires separately purchased service contract. Check with service provider for coverage and availability in your area. Separately purchased data plans or usage fees may apply. Print times and connection speeds may vary.
4. For the use cases outlined in the DOD 5220.22-M Supplement. Does not support Solid State Drives (SSDs). Requires Disk Sanitizer, External Edition for Business Desktops from hp.com.
5. For the use cases outlined in the DOD 5220.22-M Supplement. Does not support Solid State Drives (SSDs). Initial setup required. Web history deleted only in Internet Explorer and Firefox browsers and must be user enabled. With Windows 8.1, user must turn off Enhanced Protection Mode in IE11 for shred on browser close feature.
6. Requires Box registration. Offer available to new Box users only. Box App requires Windows 8 or 8.1. Offer subject to change without notice.
7. Requires Windows 8 and internet access.
8. The Wireless Hotspot application requires an active internet connection and separately purchased data plan. While HP Wireless Hotspot is active, on-device applications will continue to work and will use the same data plan as the wireless hotspot. Wireless Hotspot data usage may incur additional charges. Check with your plan for plan details. Requires Windows.
9. HP Client Security requires Windows.
10. Requires Windows 7 and internet access.
11. Requires Windows 7 or higher.

Technical Specifications - Graphics

Integrated AMD Radeon R2, R3 & R5 Graphics

Memory	Variable and user selectable in BIOS settings
Controller Clock Speed	Variable depending on the installed APU model
Maximum Color Depth	32 bpp (8-8-8-8)
Multidisplay Support	Yes (2)
Graphics /API support	DX 11.2, Shader Model 5, UVD 4.3, VCE 2.0, OpenGL 4.2 (4.1+), OpenCL 1.2, and DirectCompute 11
Output Connectors	1 VGA and 1 DisplayPort1.2

Supported Display Resolutions and Refresh Rates

Note: other resolutions may be available but are not recommended as they may not have been tested and qualified by HP

Supported Resolution	VGA Connection	DisplayPort Connection
640 x 480	85	60
800 x 600	85	60
1024 x 768	85	60
1280 x 720	85	60
1280 x 1024	85	60
1440 x 900	75	60
1600 x 1200	85	60
1680 x 1050	75	60
1920 x 1080	85	60
1920 x 1200	85	60
1920 x 1440	85	60
2048 x 1536	75	60
2560 x 1440	N/A	60
2560 x 1600	N/A	60

AMD Radeon HD 8470 Graphics Card[1]

Form Factor	Full Height
Graphics Controller	AMD Radeon HD 8470
Core Clock	775MHz
Memory Clock	900MHz
Memory	2GB, DDR3, 64-bit wide
Bus Type	PCIe Gen2
Max. Power	< 30W

Technical Specifications - Graphics

Power Source Support	12V and 3.3V
3D API Support	DX11
HDCP Support	Yes
Display Max. Resolution	Digital 2560 x 1600 Analog 2048 x 1536
Supported Graphics APIs	DX11, OpenGL, full 1080p BD (H264) playback in hardware, HDMI 1.4 support

Supported Display Resolutions and Refresh Rates

Note: other resolutions may be available but are not recommended as they may not have been tested and qualified by HP

Resolution	Refresh Rates
800 x 600	60 Hz
1024 x 768	60 Hz
1280 x 720	60 Hz
1280 x 768	60 Hz
1280 x 1024	60 Hz
1360 x 768	60 Hz
1440 x 900	60 Hz
1600 x 900	60 Hz
1680 x 1050	60 Hz
1920 x 1080	60 Hz
[1]Discrete graphics sold separately or as an optional feature.	

NVIDIA NVS 310 Graphics Card[1]

Introduction	The NVIDIA® NVS™ 310 Graphics Card is a PCI Express low profile form factor graphics add-in card targeted as an active low cost graphics solution for the corporate business and enterprise markets.
Performance and Features	The NVIDIA® NVS 310 Graphics Card offers 512 MB of ultrafast DDR3 memory and is capable of supporting up to 2 displays. DisplayPort connector supports multimode technology to support connection to DVI-D, VGA and HDMI monitors with optional adapters in kits NR078AA, FH973AT, BP937AA, AS615AA. For a DisplayPort to DisplayPort connections use the optional DisplayPort Cable Kit VN567AA.
Form Factor	Low Profile: 2.713 × 6.15 in
Graphics Controller	NVIDIA® NVS 310
Memory Clock	875MHz
Memory Size	512 MB DDR3

Technical Specifications - Graphics

Memory Bandwidth	14 GB/s	
Max. Power	19.5W	
Display Max. Resolution	Up to 2560 x 1600 (digital display) per display	
Display Output	Up to 2 displays in the following configurations	
	DisplayPort output:	• Drives two DisplayPort enabled digital display at resolutions up to 2560 × 1600 at 60 Hz with reduced blanking, when connected natively using the 2 DisplayPort connectors on the NVS 310 graphics card • Supports 2 monitors up to resolution of 1920 × 1200 at 60 Hz with reduced blanking using DisplayPort Multi-Stream topology technology.
	DVI-D output:	• Drives two digital display at resolutions up to 1920 × 1200 at 60 Hz with reduced blanking using DisplayPort to DVI-D single-link cable adaptors • Drives two digital display at resolutions up to 2560× 1600 at 60 Hz with reduced blanking using DisplayPort to DVI-D dual-link cable adaptors
	HDMI output:	• NVS 310 is capable of driving two high definition (HD) panels up to resolutions of 1920 × 1080P at 60 Hz using DisplayPort to HDMI cable adaptors
	VGA display output:	• Drives two analog display at resolutions up to 1920 × 1200 at 60 Hz using DisplayPort to VGA cable adaptors

Supported Display Resolutions and Refresh Rates

Note: other resolutions may be available but are not recommended as they may not have been tested and qualified by HP

Resolution	**Maximum Refresh Rates (Hz) by Connection**			
	DisplayPort to VGA	DisplayPort to DVI-D	DisplayPort to HDMI	DisplayPort
640 x 480	85	60	60	60
800 x 600	85	60	60	60
1024 x 768	85	60	60	60
1280 x 720	85	60	60	60
1280 x 1024	85	60	60	60
1440 x 900	75	60	60	60
1600 x 1200	60	60	60	60
1680 x 1050	60	60	60	60
1920 x 1080	60-R	60-R	60	60
1920 x 1200	60-R	60-R		60
1920 x 1440				60

Technical Specifications - Graphics

2048 x 1536				60
2560 x 1600				60
[1]Discrete graphics sold separately or as an optional feature.				

Technical Specifications - Graphics

NVIDIA NVS 315 1GB PCIe x 16 Graphics Card[1]	
Introduction	Get efficient dual-display graphics performance in a PCI Express low-profile graphics card with the NVIDIA NVS 315 PCIe x16 1 GB Graphics Card, an ideal desktop graphics solution for professional business and commercial applications.
Performance and Features	The NVIDIA® NVS 315 Graphics Card offers 1 GB of ultrafast DDR3 memory and is capable of supporting up to 2 displays. DisplayPort connector supports multimode technology to support connection to DVI-D, VGA and HDMI monitors with optional adapters in kits NR078AA, FH973AT, BP937AA, AS615AA. For a DisplayPort to DisplayPort connections use the optional DisplayPort Cable Kit VN567AA.
Form Factor	Low Profile: 2.713 × 6.15 in
Graphics Controller	NVIDIA® NVS 315
Memory Clock	875MHz
Memory Size	512 MB DDR3
Memory Bandwidth	14 GB/s
Connectors	DMS-59 , with support for dual VGA, dual DVI or dual Display Port with the appropriate adapter cable
Display Max. Resolution	Up to 2048 x 1536 VGA; 1920 x 1200 DVI; 2560 x 1600 DisplayPort
Display Output	Up to 2 displays in the following configurations

	• Dual DVI :
	  ○ Drives two DVI displays using optional HP DMS59 DVI Dual-head Connector Cable DL139A
	• Dual DisplayPort :
	  ○ Drives two DisplayPort using optional HP DMS-59 to Dual DisplayPort kit XP688AA
	• Dual VGA :
	  ○ Drives two analog using the included HP DMS-59 to Dual VGA Cable

Supported Display Resolutions and Refresh Rates

Note: other resolutions may be available but are not recommended as they may not have been tested and qualified by HP

Resolution	Maximum Refresh Rates (Hz) by Connection	
	Analog Connection	Digital Connection
640 x 480	85	60
720 x 480	85	60
720 x 576	85	60
800 x 600	85	60

Technical Specifications - Graphics

1024 x 768	85	60
1280 x 720	85	60
1280 x 768	85	60
1280 x 1024	85	60
1440 x 900	75	60
1600 x 1024	85	60
1600 x 1200	85	60
1680 x 1050	75	60
1920 x 1080	85	60-R
1920 x 1200	85	60-R
1920 x 1440	85	N/A
2048 x 1536	75	N/A
2560 x 1440	N/A	60*
2560 x 1600	N/A	60*
		* Display Port Only
[1]Discrete graphics sold separately or as an optional feature.		

NVIDIA GeForce GT630 Graphics Card[1]	
Introduction	The NVIDIA GeForce GT630 DP (2GB) PCIe x16 Card Graphics Card provides a full height, PCI Express x16 graphics add-in card solution based on the NVIDIA Kepler Architecture GPU. The card is designed to support three display connections through its DVII, and two DisplayPort connectors. An ideal solution for desktop PC customers seeking enhanced 2D and advanced 3D graphics performance, the NVIDIA GeForce GT630 DP (2GB) PCIe x16 Cards are an excellent choice for business users who want run multiple displays from a single graphics board. Engage in Web conferencing or video or photo editing, while improving your everyday business PC experience with better graphics and excellent visual display quality.
Performance and Features	The NVIDIA GeForce GT630 DP (2GB) PCIe x16 Cards deliver superior PCI Express (PCIe) Gen 3 features including: • Unprecedented flexibility for new applications and enhanced performance • Support for NVIDIA surround technology • Run multiple displays from a single graphics card • Full 16 lane PCIe Generation 3 bus support with peak bandwidth support • Wireless Display ready for future support
Form Factor	PCIe x16 Card
Graphics Controller	NVIDIA Kepler Architecture GPU
Core Clock	875 MHz
Memory Clock	891 MHz
Memory Size	2 GB DDR3 128 bit

Technical Specifications - Graphics

Memory Bandwidth	28.5 GB/s
Display Max. Resolution	2560 x 1600 digital, 2048 x 1536 analog
Display Support	Integrated 400 MHz RAMDAC

Supported Display Resolutions and Refresh Rates

Note: other resolutions may be available but are not recommended as they may not have been tested and qualified by HP

Resolution	**Maximum Refresh Rates (Hz)**	
	Analog Connection	Digital Connection
640 x 480	85	60
800 x 600	85	60
1024 x 768	85	60
1280 x 720	85	60
1280 x 1024	85	60
1440 x 900	75	60
1600 x 1200	85	60
1680 x 1050	75	60
1920 x 1080	85	60-R
1920 x 1200	85	60-R
1920 x 1440	85	60
2048 x 1536	75	60
2560 x 1600	N/A	60

[1]Discrete graphics sold separately or as an optional feature.

AMD Radeon HD 8350 1GB PCIe x16 DH Graphics Card[1]

Introduction	Get stable 2D and advanced 3D graphics performance from the AMD Radeon HD 8350 1 GB PCIe x16 DH Graphics Card, a low profile, PCI Express x16 graphics add-in card based on the AMD Radeon HD 8350 GPU, great for Web conferencing or video and photo editing.
Form Factor	PCie x16
Graphics Controller	AMD Radeon HD 8350
Core Clock	GPU engine operates at 523 MHz
Memory	1GB, DDR3, SDRAM
Memory Clock	875 MHz
HDCP Support	Yes
Display Max. Resolution	Digital 1920 x 1200 Analog 2048 x 1536

Technical Specifications - Graphics

Supported Display Resolutions and Refresh Rates **Note**: other resolutions may be available but are not recommended as they may not have been tested and qualified by HP		
	Analog Connection	Digital Connection
640 x 480	85	60
720 x 480	85	60
720 x 576	85	60
800 x 600	85	60
1024 x 768	85	60
1280 x 720	85	60
1280 x 768	85	60
1280 x 1024	85	60
1440 x 900	75	75
1600 x 1024	85	60
1600 x 1200	85	60
1680 x 1050	75	75-R
1920 x 1080	85	60-R
1920 x 1200	85	60-R
1920 x 1440	85	N/A
2048 x 1536	75	N/A
2560 x 1440	N/A	N/A
2560 x 1600	N/A	N/A
[1]Discrete graphics sold separately or as an optional feature.		

AMD Radeon HD 8490 1GB PCIe x16 Graphics Card[1]	
Introduction	Get impressive graphics and high resolution dual-display performance in a low profile, PCI Express x16 graphics add-in card based on the AMD Radeon HD 8490 Graphics Processor. Improve your everyday PC, Web conferencing, and video or photo editing.
Form Factor	PCie x16
Graphics Controller	AMD Radeon HD 8490
Core Clock	GPU engine operates at 875 MHz
Memory	1GB, DDR3, SDRAM
Memory Clock	900 MHz
HDCP Support	Yes
Display Max. Resolution	Digital 2560 x 1600 Analog 2048 x 1536

Technical Specifications - Graphics

Supported Display Resolutions and Refresh Rates **Note**: other resolutions may be available but are not recommended as they may not have been tested and qualified by HP		
	Analog Connection	Digital Connection
300 x 200	85	60
320 x 240	85	60
400 x 300	85	60
640 x 480	85	60
720 x 480	85	60
720 x 576	85	60
800 x 600	85	60
1024 x 768	85	60
1280 x 720	85	60
1280 x 768	85	60
1280 x 1024	85	60
1440 x 900	75	75
1600 x 900	85	60
1600 x 1024	85	60
1600 x 1200	85	60
1680 x 1050	75	75-R
1920 x 1080	85	60-R
1920 x 1200	85	60-R
1920 x 1440	85	N/A
2048 x 1536	75	N/A
2560 x 1440	N/A	60
2560 x 1600	N/A	60
[1]Discrete graphics sold separately or as an optional feature.		

AMD Radeon R7 240 2GB FH PCIe x16 GFX Graphics Card[1]	
Form Factor	Full Height
Graphics Controller	AMD Radeon R7 240
Core Clock	730MHz
Memory Clock	1800MHz
Memory	2GB, DDR3
Frame Buffer	128-bit wide frame buffer
Bus Type	PCI Express 3.0 interface
Max. Power	32.71 W

Technical Specifications - Graphics

Power Source Support	12V and 3.3V
HDCP Support	Yes, All digital outputs support HDCP (High-Bandwidth Digital Content Protection)
Display Max. Resolution	Digital 1920 x 1200 Analog 2048 x1536
Compliance	Compliant with all listed and with all applicable ACPI, AGP Forum, ANSI, DDWG, HP, Intel, ITU, Microsoft, PCI SIG, SMPTE, and VESA APIs, standards, requirements, implementation guides, and ECRs.

SUPPORTED DVI-D (DIGITAL) AND DISPLAYPORT DISPLAY MODES

Note: other resolutions may be available but are not recommended as they may not have been tested and qualified by HP

Resolution	Refresh Rates
640 x 480	60 Hz
720 x 480	60 Hz
720 x 576	60 Hz
800 x 600	60 Hz
1024 x 768	60 Hz
1280 x 720	60 Hz
1280 x 768	60 Hz
1280 x 1024	60 Hz
1440 x 900	60 Hz, 75 Hz
1600 x 1024	60 Hz
1600 x 1200	60 Hz
1680 x 1050	75 Hz
1920 x 1080	60 Hz
[1]Discrete graphics sold separately or as an optional feature.	

AMD Radeon R9 255 2GB PCIe x16 GFX[1]

Form Factor	PCie x16
Graphics Controller	AMD Radeon R9 255
Core Clock	900MHz
Memory Clock	1150MHz
Memory	2GB, (4 pcs of 4Gb 128Mx32 GDDR5)
Frame Buffer	128-bit wide frame buffer
Bus Type	PCI Express 3.0 interface
Max. Power	N/A

Technical Specifications - Graphics

Power Source Support	12V and 3.3V
HDCP Support	Yes, All digital outputs support HDCP (High-Bandwidth Digital Content Protection)
Display Max. Resolution	Digital 1920 x 1200 Analog 2048 x1536
Compliance	Compliant with all listed and with all applicable ACPI, AGP Forum, ANSI, DDWG, HP, Intel, ITU, Microsoft, PCI SIG, SMPTE, and VESA APIs, standards, requirements, implementation guides, and ECRs. Supports Microsoft DirectX 11.1, OpenGL 4.3 and OpenCL 1.2 APIs.

SUPPORTED DVI-D (DIGITAL) AND DISPLAYPORT DISPLAY MODES

Note: other resolutions may be available but are not recommended as they may not have been tested and qualified by HP

Resolution	Refresh Rates
320 x 200	60 Hz
320 x 240	60 Hz
400 x 300	60 Hz
480 x 360	60 Hz
512 x 384	60 Hz
640 x 350	60 Hz
640 x 400	60 Hz
640 x 480	60 Hz
720 x 480	60 Hz
720 x 576	60 Hz
800 x 600	60 Hz
1024 x 768	60 Hz
1152 x 864	60 Hz
1280 x 720	60 Hz
1280 x 768	60 Hz
1280 x 960	60 Hz
1280 x 1024	60 Hz
1440 x 900	60 Hz, 75 Hz
1600 x 900	60 Hz
1600 x 1024	60 Hz
1600 x 1200	60 Hz
1680 x 1050	75 Hz
1680 x 1080	60 Hz
1920 x 1080	60 Hz
2560 x 1440	60 Hz
2560 x 1600	60 Hz
[1]Discrete graphics sold separately or as an optional feature.	

Technical Specifications - Hard Disk and Solid State Storage

Introduction:

HP Serial Advanced Technology Attachment (SATA) Hard Drives maximize the performance of HP Business PCs by providing the technologies to meet your increasing storage demands with high-capacity drives offering superior reliability and performance.

SATA provides faster data transfer speeds, better system cooling airflow, more bandwidth, more headroom for speed increases in future generations and better data integrity. A next-generation technology, the SATA interface connects hard drives to the PC platform enabling easy aggregation of multiple hard drives into a single PC. This offers you the additional benefits of dedicated bandwidth, the ability to more easily identify device failures and scalability. The HP ProDesk 405 G2 Series Business PC supports the latest SATA 6.0Gb/s specification.

SMART IV Technology

Self Monitoring Analysis and Reporting Technology (SMART) hard drive technology allows hard drives to monitor their own health and to raise flags if imminent failures are predicted. If the drive determines that a failure is imminent, the SMART hard drive technology enables the intelligent manageability or management software to generate a fault alert. While the current versions of SMART hard drives do a good job monitoring the data on the hard drive media, the ever increasing emphasis on reliability and quality has promoted HP to implement SMART IV technology which constantly checks that the data flow from host interface to media and media to host interface is not compromised. This is accomplished by inserting a 2 byte parity code into every 512 byte block in the data path of the hard drive's Cache RAM. This unique parity checking performed by HP's SMART IV technology hard drives, allows for more complete error detection coverage encompassing the entire data path between the host and the hard drive.

Smart IV is also known as IOEDC: I/O Error Detection Code.

Native Command Queuing

NCQ or Native Command Queuing is a SATA protocol extension that allows the hard drive to have several write or read commands outstanding at the same time. In contrast, normal non-queued operation requires each command to be completed before the next command is issued by the host system. Queuing allows the drive to complete the commands in the order that allows for best overall throughput. It also involves an advanced method of transferring data to or from the host, called First Party Direct Memory Access (FPDMA), which allows the hard drive and the host controller to manage the data transfers for multiple outstanding commands, without involving the host processor. NCQ can contribute to better performance but the results are dependent on many factors, including the access patterns of the various applications and operating system functions that are initiating drive accesses. Enabling NCQ features in the hard drive requires AHCI support from the host system BIOS, controller, and driver. AHCI support is typically implemented in RAID configurations.

***Note:** For hard drives and solid state drives, GB = 1 billion bytes. TB = 1 trillion bytes. Actual formatted capacity is less. Up to 16 GB (for Windows 7) and 30 GB (for Windows 8.1) of system disk is reserved for the system recovery software.

HP 256 GB* (non-SED) TLC Solid State Drive	
Unformatted Capacity	256 GB*
Architecture	Triple Level Cell (TLC) NAND
Interface	SATA 6 GB/sec
Dimensions (W x H x D)	2.75 x 0.276 x 3.96 in (6.985 x 0.7 x 10.05 cm)

Technical Specifications - Hard Disk and Solid State Storage

Weight	0.1 lb (45 g)	
Bandwidth Performance	Sustained Sequential Read:	Up to 510 MB/s
	Sustained Sequential Write:	Up to 280 MB/s
	Random Read (4KB):	up to 90K IOPs
	Random Write (4KB):	up to 70K IOPs
Latency	Read:	55ms (TYP)
	Write:	55ms (TYP)
Power	DC power requirement:	Min 4.75 V; Max 5.25 V
	Total power consumption:	160 mW (Active) ; <85 mW; (Idle)
Useful Drive Life	1.2 million device hours**	
Environmental (all conditions, non-condensing)	Operating Temperature:	32° to 158° F (0° to 70° C)
	Relative Humidity (operating):	5% to 95%
	Shock:	1,500 G/1.0 msec
Regulations	UL, CSA, EN 60950-2000, CISPR Pub 22 Class B, CNS 13438, AS/NZS CISPR 22:2002 Class B, Korea KCC, CE Mark	

* For solid state disk drives, GB means 1 billion bytes. Actual formatted capacity is less. Up to 16GB for Windows 7 and up to 36GB for Windows 8.1 is reserved for system recovery software.** The product achieves a mean time between failure (MTBF) based on population statistics not relevant to individual units.

HP 128 GB* (non-SED) TLC Solid State Drive		
Unformatted Capacity	128 GB*	
Architecture	Triple Level Cell (TLC) NAND	
Interface	SATA 6 GB/sec	
Dimensions (W x H x D)	2.75 x 0.276 x 3.96 in (6.985 x 0.7 x 10.05 cm)	
Weight	0.1 lb (45 g)	
Bandwidth Performance	Sustained Sequential Read:	Up to 510 MB/ss

Technical Specifications - Hard Disk and Solid State Storage

	Sustained Sequential Write:	Up to 140 MB/s
	Random Read (4KB):	up to 90K IOPs
	Random Write (4KB):	up to 36K IOPs
Latency	Read:	55ms (TYP)
	Write:	55ms (TYP)
Power	DC power requirement:	Min 4.75 V; Max 5.25 V
	Total power consumption:	160 mW (Active) ; <85 mW; (Idle)
Useful Drive Life	1.2 million device hours**	
Environmental (all conditions, non-condensing)	Operating Temperature:	32° to 158° F (0° to 70° C)
	Relative Humidity (operating):	5% to 95%
	Shock:	1,500 G/1.0 msec
Regulations	UL, CSA, EN 60950-2000, CISPR Pub 22 Class B, CNS 13438, AS/NZS CISPR 22:2002 Class B, Korea KCC, CE Mark	

* For solid state disk drives, GB means 1 billion bytes. Actual formatted capacity is less. Up to 16GB for Windows 7 and up to 36GB for Windows 8.1 is reserved for system recovery software.** The product achieves a mean time between failure (MTBF) based on population statistics not relevant to individual units.

2TB* 7.2K rpm SATA 6.0Gb/s 3.5" Hard Disk Drive		
Unformatted Capacity	2 TB	
Rotational Speed	7,200 rpm	
Interface	SATA 6 Gb/s	
Cache, Multisegmented (MB)	64 MB	
Seek Time (average)	Read	<8.5 ms
	Write	<9.5 ms
Height	1.028 in/26.11 mm	
Width	4.0 in/101.6 mm	

Technical Specifications - Hard Disk and Solid State Storage

Depth	5.787 in/146.99 mm	
Weight	1.38 lb/626 g	
Operating Temperature	41° to 131° F (5° to 55° C)	
1TB* 7.2K rpm SATA 6.0Gb/s 3.5" Hard Disk Drive		
Capacity	1,000,204,886,016 bytes	
Rotational Speed	7,200 rpm	
Interface	Serial ATA 3.0 (6.0 Gb/s)	
Buffer Size	32 MB	
Logical Blocks	1,953,525,168	
Seek Time (typical reads, includes controller overhead, including settling)	Single Track:	2.0 ms
	Average:	11 ms
	Full-Stroke:	21 ms
Height (nominal)	1 in/2.54 cm	
Width (nominal)	Media diameter: 3.5 in/8.89 cm	
	Physical size: 4 in/10.2 cm	
Operating Temperature	41° to 131° F (5° to 55° C)	

500GB* 7.2K rpm SATA 6.0Gb/s 3.5" Hard Disk Drive		
Capacity	500,107,862,016 bytes	
Rotational Speed	7,200 rpm	
Interface	Serial ATA 3.0 (6.0 Gb/s)	
Buffer Size	16 MB	
Logical Blocks	976,773,168	
Seek Time (typical reads, includes controller overhead, including settling)	**Single Track:**	2.0 ms
	Average:	11 ms
	Full-Stroke:	21 ms
Height (nominal)	1 in/2.54 cm	

Technical Specifications - Hard Disk and Solid State Storage

Width (nominal)	Media diameter: 3.5 in/8.89 cm
	Physical size: 4 in/10.2 cm
Operating Temperature	41° to 131° F (5° to 55° C)

500GB* 7200 RPM SATA 2.5" Self-Encrypting (SED) Hard Disk Drive

Capacity	500,107,862,016 bytes	
Rotational Speed	7,200 rpm	
Drive Type	Self-Encrypting Drive (SED) with SATA interface	
Interface	SATA 6 Gb/s	
Segmented Buffer with write cache	32768 KB - A portion of buffer capacity used for firmware	
Number of Sectors	976,773,168	
Seek Time (typical reads)	Single Track:	1.0 ms
	Average:	13 ms
	Full-Stroke:	25 ms
Media Diameter	2.5 in/63.5 mm	
Height	0.267 in/6.8 mm, ±0.2mm	
Width	2.75 in/69.85 mm, ±0.25mm	
Length	3.945 in/100.2 mm, ±0.25mm	
Weight	3.35 oz/95 g (max)	
Operating Temperature	41° to 131° F (5° to 55° C)	

1TB* SATA 6G 2.5" 8GB Solid State Hybrid Drive (SSHD)

Formatted Capacity	1 TB
Spindle Speed	5,400 rpm +/- 0.2%
Drive Type	Solid State Hybrid Drive (SSHD) technology with NAND Flash
Interface	Serial ATA (SATA)

Technical Specifications - Hard Disk and Solid State Storage

Cache Buffer	64 MB	
NAND Flash Commercial Multilevel Cell (cMLC)	8 GB	
Number of Sectors	976,773,168	
Seek Time (typical reads)	Single Track:	2.0 ms
	Average:	12 ms
Height	0.374 +/-.008 in (9.5 +/- 0.2 mm)	
Width	2.750 +/- 0.010 in (69.85 +/- 0.25 mm)	
Length	3.951 +0.008 / -0.010 in (100.35 +0.20 / -0.25 mm)	
Weight	0.254 lb/115 g (max)	
Operating Temperature	41° to 131° F (5° to 55° C)	

500 GB* SATA 6G 2.5" 8GB Solid State Hybrid Drive (SSHD)

Formatted Capacity	500 GB	
Spindle Speed	5,400 rpm +/- 0.2%	
Drive Type	Solid State Hybrid Drive (SSHD) technology with NAND Flash	
Interface	Serial ATA (SATA)	
Cache Buffer	64 MB	
NAND Flash Commercial Multilevel Cell (cMLC)	8 GB	
Number of Sectors	976,773,168	
Seek Time (typical reads)	Single Track:	2.0 ms
	Average:	12 ms
Height	0.268 +/-.008 in (6.8 +/- 0.2 mm)	
Width	2.750 +/- 0.010 in (69.85 +/- 0.25 mm)	
Length	3.951 +0.008 / -0.010 in (100.35 +0.20 / -0.25 mm)	
Weight	0.209 lb/95 g (max)	

Technical Specifications - Hard Disk and Solid State Storage

Operating Temperature	41° to 131° F (5° to 55° C)	

128 GB* Solid State Drive

Unformatted Capacity	128 GB*	
Architecture	Multi Level Cell (MLC) NAND	
Interface	SATA 6 GB/sec	
Dimensions (W x H x D)	2.75 x 0.276 x 3.96 in (6.985 x 0.7 x 10.05 cm)	
Weight	0.16 lb (73 g)	
Bandwidth Performance	Sustained Sequential Read:	Up to 450 MB/ss
	Sustained Sequential Write:	Up to 260 MB/s
	Random Read (4KB):	up to 46K IOPs
	Random Write (4KB):	up to 56K IOPs
Latency	Read:	55ms (TYP)
	Write:	55ms (TYP)
Power	DC power requirement:	Min 4.5 V; Max 5.5 V
	Total power consumption:	160 mW (Active) ; <85 mW; (Idle)
Useful Drive Life	1.2 million device hours**	
Environmental (all conditions, non-condensing)	Operating Temperature:	32° to 158° F (0° to 70° C)
	Relative Humidity (operating):	5% to 95%
	Shock:	1,500 G/1.0 msec
Regulations	UL, CSA, EN 60950-2000, CISPR Pub 22 Class B, CNS 13438, AS/NZS CISPR 22:2002 Class B, Korea KCC, CE Mark	

* For solid state disk drives, GB means 1 billion bytes. 128GB is the unformatted capacity of this drive before a portion of the drive is reserved for flash management features. Actual capacity will vary by content
** The product achieves a mean time between failure (MTBF) based on population statistics not relevant to individual units.

500GB* 2.5" FIPS 140-2 SED Solid State Drive

Formatted Capacity	500 GB
Architecture	Self-Encrypting (SED) Solid State Drive with SATA interface.
Interface	Serial ATA (6.0 Gb/s)

Technical Specifications - Hard Disk and Solid State Storage

Form Factor	2.5 inch		
Height	6.80 mm ± 0.20		
Width	69.85 mm ± 0.25		
Length	100.35 mm ± 0.25/0.20		
Weight (typical)	<95 g (0.209 lb)		
Bandwidth Performance	Sustained data transfer rate OD	100 MB/s max	
	I/O data-transfer rate	600 MB/s max	
Power	Power consumption:	Spinup (max): 1.00A Idle, active: 0.70W Sleep 0.18W	
Environmental (all conditions, non-condensing)	Operating Temperature:		32° to 140° F (0° to 60° C)
	Relative Humidity:		5% to 95%
	Shock:		Maximum 400 G/2 ms

256GB* SATA 2.5” Opal2 SED Solid State Drive

Unformatted Capacity	256 GB 500,118,192 (User Addressable Sectors)
Architecture	Self-Encrypting (SED) Solid State Drive with NAND Flash and SATA interface. Trusted Computing Group(TCG) OPAL compliant encrypted solid state drive
Interface	Serial ATA (6.0 Gb/s)
Form Factor	2.5 inch
Height	6.80 mm ± 0.20
Width	69.85 mm ± 0.25
Length	100.20 mm ± 0.25
Weight	Up to 55 g

Technical Specifications - Hard Disk and Solid State Storage

Bandwidth Performance	Sustained Sequential Read:	Up to 520 MB/s
	Sustained Sequential Write:	Up to 500 MB/s
Power	Power consumption:	Active: 0.78A / 3.891W; Idle: 0.005A / 0.026W
Mean Time Between Failure (MTBF)	1,500,000 hours	
Environmental (all conditions, non-condensing)	Operating Temperature:	32° to 158° F (0° to 70° C)
	Relative Humidity:	5% to 95%
	Shock:	1,500 G/0.5 ms

256 GB* SATA 2.5" Self-Encrypting (SED) Solid State Drive

Unformatted Capacity	256,186,271 user addressable sectors	
Architecture	Self-Encrypting (SED) Solid State Drive with 25nm MLC NAND Flash and SATA interface	
Interface	Serial ATA 2.0 (3.0 Gb/s)	
NAND Flash	25nm MLC NAND Flash	
Height	.275 in/7mm	
Width	2.75 in/69.85 mm	
Length	3.95 in/100.5 mm	
Weight	0.161 lb (73 g)	
Bandwidth Performance	Sustained Sequential 128k Read:	Up to 450 MB/s
	Sustained Sequential 128k Write:	Up to 260 MB/s
	Random 4k Read:	Up to 46K IOPs
	Random 4k Write:	Up to 56K IOPs
Latency	Read:	55 µs
	Write:	55 µs
Power	SATA power consumption:	160 mW (active average); <85 mW (idle average)

Technical Specifications - Hard Disk and Solid State Storage

Useful Drive Life	72TB written, up to 40GB/day for 5 years	
Environmental (all conditions, non-condensing)	Operating Temperature:	32° to 158° F (0° to 70° C)
	Relative Humidity:	5% to 95%
	Shock:	1,500 G/1 ms

180GB* SATA 2.5” Opal1 SED Solid State Drive (Pro 1500)

Unformatted Capacity	351,651,888 Unformatted Capacity (Total User Addressable Sectors in LBA mode)	
Architecture	Self-Encrypting (SED) Solid State Drive with 20nm MLC NAND Flash and SATA interface	
Interface	Serial ATA (6.0 Gb/s)	
NAND Flash	20nm MLC NAND Flash	
Form Factor	2.5 inch	
Thickness	7 mm	
Weight	Up to 78 g	
Bandwidth Performance	Sustained Sequential Read:	Up to 540 MB/s
	Sustained Sequential Write:	Up to 490 MB/s
	Random 4k Read:	Up to 41K IOPs
	Random 4k Write:	Up to 80K IOPs
Power	SATA power consumption:	195 mW (active average); 125 mW (idle average)
Mean Time Between Failure (MTBF)	1,200,000 hours	
Environmental (all conditions, non-condensing)	Operating Temperature:	32° to 158° F (0° to 70° C)
	Relative Humidity:	5% to 95%
	Shock:	1,500 G/0.5 ms

128GB* SATA 2.5” Opal2 SED Solid State Drive

Technical Specifications - Hard Disk and Solid State Storage

Unformatted Capacity	128 GB 250,069,680 (User Addressable Sectors)	
Architecture	Self-Encrypting (SED) Solid State Drive with NAND Flash and SATA interface. Trusted Computing Group(TCG) OPAL compliant encrypted solid state drive	
Interface	Serial ATA (6.0 Gb/s)	
Form Factor	2.5 inch	
Height	6.80 mm ± 0.20	
Width	69.85 mm ± 0.25	
Length	100.20 mm ± 0.25	
Weight	Up to 55 g	
Bandwidth Performance	Sustained Sequential Read:	Up to 520 MB/s
	Sustained Sequential Write:	Up to 340 MB/s
Power	Power consumption:	Active: 0.78A / 3.891W; Idle: 0.005A / 0.026W
Mean Time Between Failure (MTBF)	1,500,000 hours	
Environmental (all conditions, non-condensing)	Operating Temperature:	32° to 158° F (0° to 70° C)
	Relative Humidity:	5% to 95%
	Shock:	1,500 G/0.5 ms

120GB* SATA 2.5” Opal1 SED Solid State Drive

Unformatted Capacity	234,442,648 Unformatted Capacity (Total User Addressable Sectors in LBA mode)
Architecture	Self-Encrypting (SED) Solid State Drive with 20nm MLC NAND Flash and SATA interface
Interface	Serial ATA (6.0 Gb/s)
NAND Flash	20nm MLC NAND Flash
Form Factor	2.5 inch

Technical Specifications - Hard Disk and Solid State Storage

Thickness	7 mm	
Weight	Up to 78 g	
Bandwidth Performance	Sustained Sequential Read:	Up to 540 MB/s
	Sustained Sequential Write:	Up to 480 MB/s
	Random 4k Read:	Up to 41K IOPs
	Random 4k Write:	Up to 80K IOPs
Power	SATA power consumption:	195 mW (active average); 125 mW (idle average)
Mean Time Between Failure (MTBF)	1,200,000 hours	
Environmental (all conditions, non-condensing)	Operating Temperature:	32° to 158° F (0° to 70° C)
	Relative Humidity:	5% to 95%
	Shock:	1,500 G/0.5 ms

1TB* 10K SATA 6.0Gb/s 3.5" Hard Disk Drive

Capacity	500,107,862,016 bytes	
Rotational Speed	7,200 rpm	
Interface	Serial ATA 2.0 (6.0 Gb/s)	
Buffer Size	16 MB	
Logical Blocks	976,773,168	
Seek Time (typical reads, includes controller overhead, including settling)	Single Track:	2.0 ms
	Average:	12 ms
	Full-Stroke:	25 ms
Height (nominal)	0.374 in/9.5 mm	
Width (nominal)	Media diameter: 2.5 in/63.5 mm	
	Physical size: 2.75 in/70 mm	
Operating Temperature	41° to 131° F (5° to 55° C)	

Technical Specifications - Hard Disk and Solid State Storage

Technical Specifications - Removable Storage

HP Slim SuperMulti DVD Writer Drive*		
Height	12.7mm height	
Orientation	Either horizontal or vertical	
Interface type	SATA/ATAPI	
Disc recording capacity	Up to 8.5 GB DL or 4.7 GB standard	
Dimensions (W x H x D)	5.04 x 0.5 x 5.0 in (128 x 12.7 x 127 mm) without bezel	
Weight (max)	0.42 lb (190 g)	
Write speeds	DVD-RAM	Up to 5X
	DVD-R DL	Up to 6X
	DVD+R	Up to 8X
	DVD+RW	Up to 8X
	DVD+R DL	Up to 6X
	DVD-R	Up to 8X
	DVD-RW	Up to 6X
	CD-R	Up to 24X
	CD-RW	Up to 24X
Read speeds	DVD-RAM	Up to 5X
	DVD-RW, DVD+RW	Up to 8X
	DVD-R DL, DVD+R DL	Up to 8X
	DVD+R, DVD-R	Up to 8X
	DVD-ROM DL, DVD-ROM	Up to 8X
	CD-ROM, CD-R	Up to 24X
	CD-RW	Up to 24X
Access time (typical reads, including settling)	Random	DVD-ROM: 170 ms (typical), CD-ROM: 170 ms (typical)
	Full Stroke	DVD-ROM: 320 ms (typical), CD-ROM: 320 ms (typical)
	Stop Time	6 seconds (typical)
Power	Source	Slimline SATA DC power receptacle
	DC Power Requirement	5 VDC ± 5%-100 mV ripple p-p
	DC Current	5 VDC (< 1000 mA typical, 1600 mA maximum)
Environmental conditions (operating - non-condensing)	Temperature	41° to 122° F (5° to 50° C)
	Relative Humidity	10% to 80%

Technical Specifications - Removable Storage

	Maximum Wet Bulb Temperature	84° F (29° C)

HP Slim Blu-ray BDXL Drive*			
Height	12.7mm height		
Orientation	Either horizontal or vertical		
Interface type	SATA/ATAPI		
Disc recording capacity	Up to 128 GB QL, 100 GB TL, 50 GB DL or 25 GB standard SL		
Dimensions (W x H x D)	5.04 x 0.5 x 5.0 in (128 x 12.7 x 127 mm) without bezel		
Weight (max)	Up to 0.37 lb (170 g) without bezel		
		Triple-layer	**Quadruple-layer**
Write speeds	BD-R	Up to 4X	Up to 4X
	BD-RE	Up to 2X	Not supported
		Single-layer	**Double-layer**
	BD-R	Up to 6X	Up to 6X
	BD-RE	Up to 2X	Up to 2X
	DVD-R	Up to 8X	Up to 6X
	DVD-RW	Up to 6X	Not supported
	DVD+R	Up to 8X	Up to 6X
	DVD+RW	Up to 8X	Not supported
	DVD-RAM	Up to 5X	
	CD-R	Up to 24X	
	CD-RW	Up to 24X	
		Triple-layer	**Quadruple-layer**
	BD-R	Up to 4X	Up to 4X
	BD-RE	Up to 4X	Not supported
		Single-layer	**Double-layer**
	BD-ROM	Up to 6X	Up to 6X
	BD-R	Up to 6X	Up to 6X
Read speeds	BD-RE	Up to 6X	Up to 6X
	DVD-ROM	Up to 8X	Up to 8X
	DVD-R	Up to 8X	Up to 8X
	DVD-RW	Up to 8X	
	DVD+R	Up to 8X	Up to 8X

Technical Specifications - Removable Storage

	DVD+RW	Up to 8X	
	BDMV (AACS Compliant Disc)	Up to 6X/2X (Read/Play)	
	DVD-RAM	Up to 5X	
	DVD-Video (CSS Compliant Disc)	Up to 8X/4X (Read/Play)	
	CD-R/RW/ROM	Up to24X	
	CD-DA(DAE)	Up to 20X/10X (Read/Play)	
Access time (typical reads, including settling)	Random	BD-ROM: 205 ms (typical), DVD-ROM: 185 ms (typical), CD-ROM: 165 ms (typical)	
	Full Stroke	BD-ROM: 350 ms (typical), DVD-ROM: 345 ms (typical), CD-ROM: 340 ms (typical)	
Power	Source	Slimline SATA DC power receptacle	
	DC Power Requirement	5 VDC ± 5%-100 mV ripple p-p	
	DC Current	5 VDC -1200 mA typical, 2000 mA maximum	
Environmental conditions (operating - non-condensing)	Temperature	41° to 122° F (5° to 50° C)	
	Relative Humidity	10% to 80%	
	Maximum Wet Bulb Temperature	84° F (29° C)	

HP Slim DVD-ROM Drive*		
Height	12.7mm	
Orientation	Either horizontal or vertical	
Interface type	SATA/ATAPI	
Dimensions (W x H x D)	5.04 x 0.5 x 5.0 in (128 x 12.7 x 127 mm) without bezel	
Weight (max)	Up to 0.37 lb (170 g) without bezel	
Read speeds	DVD+R/-R/+RW/ -RW/+R DL /-R DL	Up to 8X
	DVD-ROM	Up to 8X
	CD-ROM, CD-R	Up to 24X
	CD-RW	Up to 24X
Access time (typical reads, including settling)	Random	DVD-ROM: 170 ms (typical), CD-ROM: 170 ms (typical)
	Full Stroke	DVD-ROM: 320 ms (typical), CD-ROM: 320 ms (typical)
Power	Source	Slimline SATA DC power receptacle
	DC Power Requirement	5 VDC ± 5%-100 mV ripple p-p
	DC Current	5 VDC - <1000 mA typical, < 1600 mA maximum

Technical Specifications - Removable Storage

Environmental (all conditions non-condensing)	Temperature	41° to 122° F (5° to 50° C)
	Relative Humidity	10% to 80%
	Maximum Wet Bulb Temperature (operating)	84° F (29° C)

*Duplication of copyrighted material is strictly prohibited. Actual speeds may vary. Double Layer media compatibility will widely vary with some home DVD players and DVD-ROM drives. Note that DVD-RAM cannot read or write to 2.6GB Single Sided/5.2 Double Sided-Version 1.0 Media.

Technical Specifications – Memory

System Memory Support

The HP ProDesk 405 G2 Business PC supports DDR3/DDR3L protocols with two independent, 64-bit wide channels each accessing one or two DIMMs.

- Two channels of non-ECC DDR3/DDR3L unbuffered dual in-line memory modules (UDIMM) or DDR3/DDR3L unbuffered small outline dual in-line memory modules (SO-DIMM) with a maximum of two DIMMs per channel
- Single-channel and dual-channel memory organization modes
- Data burst length of eight for all memory organization modes
- Memory data transfer rates of up to 1600 MT/s; actual supported data transfer rate determined by the configured processor.
- 64-bit wide channels
- DDR3/DDR3L system memory I/O voltage of 1.5V
- Theoretical maximum memory bandwidth of:
    - 21.3 GB/s in dual-channel mode assuming 1333 MT/s
    - 25.6 GB/s in dual-channel mode assuming 1600 MT/s

Platform Memory Support

- Microtower (MT) platforms support up to two (2) industry-standard DDR3-SDRAM DIMMs.

CAUTION: You must shut down the computer and disconnect the power cord before adding or removing memory modules. Regardless of the power-on state, voltage is always supplied to the memory modules as long as the computer is plugged in to an active AC outlet. Adding or removing memory modules while voltage is present may cause irreparable damage to the memory modules or system board.

NOTE: For systems configured with more than 3 GB of memory and a 32-bit operating system, all memory may not be available due to system resource requirements. Addressing memory above 4 GB requires a 64-bit operating system.

Technical Specifications – Networking/Communication

Intel 7260 802.11 a/b/g/n PCIe x1 WLAN Card *		
Dimensions (L x H)	0.12 x 1.06 x 1.18 in (3.1 x 26.8 x 30.0 mm)	
Chipset	Atheros AR9462	
System interface	PCI-Express Mini Card	
Network standard	802.11 a/b/g/n	
Frequency band	Wi-Fi: 802.11a/n – 4.9 – 4.95 GHz (Japan), 5.15 – 5.25 GHz, 5.25 – 5.35 GHz, 5.47 – 5.725 GHz, 5.825 – 5.850 GHz 802.11b/g/n 2.402-2.482 GHz	
Operating temperature	14° to 158°F, operating (-10° to 70°C, operating)	
Storage temperature	-40° to 176°F, non-operating (-40° to 80°C, non-operating)	
Humidity	10-90% operating 5-95% non-operating	
Operating voltage	3.3 V ±9% I/O supply voltage	
Power Consumption	**Platform/WLAN Mode**	**Power Consumption**
	Wi-Fi	
	Transmit Mode	2 W
	Receive Mode	1.6 W
	Idle mode (PSP) (WLAN Associated)	250mW
	Idle mode (WLAN unassociated)	100mW
	Radio disabled	75mW
Output Power	2.4G: +13.5dBm minimum	

Technical Specifications – Networking/Communication

	5G: +12dBm minimum	
Security	IEEE and WiFi compliant 64 / 128 bit WEP encryption for a/b/g mode only	
	802.1x authentication	
	WPA, WPA2: 802.1x. WPA-PSK, WPA2-PSK, TKIP, and AES	
	IEEE 802.11i	
	Cisco Certified Extensions, all versions through CCX4 and CCX Lite	
	WAPI	
Antenna	2 transmit; 2 receive (2x2)	
* Wireless access point and Internet service required and not included. Availability of public wireless access points limited.		

Technical Specifications – Networking/Communication

Realtek RTL8151GH-CG GbE LOM Network Adapter		
Connector	RJ-45	
System Interface	Integrated on PCA	
Controller	Realtek RTL8151GH-CG Gigabit Ethernet Controller	
Memory	16 KB FIFO packet buffer memory	
Data rates supported	10/100/1000 Mbps	
IEEE Compliance	802.1P 802.1Q 802.3 802.3ab 802.3az 802.3u	
Bus architecture	PCI Express	
Data transfer mode	PCIe-based interface for active state operation (S0 state)	
Power requirement	Requires 3.3V and 1V or just 3.3V with integrated regulators Power consumption 0.425 W	
Network transfer mode	Full-duplex	
	Half-duplex (not supported for the 1000BASE-T transceiver)	
Network transfer rate	10BASE-T (half-duplex) 10 Mbps	
	10BASE-T (full-duplex) 20 Mbps	
	100BASE-TX (half-duplex) 100 Mbps	
	100BASE-TX (full-duplex) 200 Mbps	
	1000BASE-T (full-duplex) 2000 Mbps	
Environmental	Operating Temperature:	32° to 158° F (0° to 70° C)
	Operating Humidity:	60% RH
Management	WOL, auto MDI crossover, PXE, Muti-port teaming, Advanced cable diagnostic	

Intel® Ethernet I210-T1 Gigabit Network Adapter	
Connector	RJ-45
System Interface	PCI Express x1
Controller	Intel® I210 Gigabit Ethernet Controller

Technical Specifications – Networking/Communication

Memory	Integrated Dual 48K configurable transmit receive FIFO Buffers	
Data rates supported	10/100/1000 Mbps	
IEEE Compliance	802.1P 802.1Q 802.2 802.3 802.3AB 802.3u 802.3x flow control	
Bus architecture	PCI-E 2.1	
Data path width	X1, 250 MB/s, Bi-directional interface	
Data transfer mode	Bus-master DMA	
Hardware certifications	FCC, B, CE, TUV-c, TUVus Mark Canada and United States, TUV-GS Mark for European Union	
Power requirement	Aux 3.3 V, 3.0 Watts in 1000 base-T and 1.0 Watts in 100 Base-T	
Boot ROM support	Yes 10BASE-T (half-duplex) 10 Mbps 10BASE-T (full-duplex) 20 Mbps	
Network transfer rate	10BASE-T (half-duplex) 10 Mbps	
	10BASE-T (full-duplex) 20 Mbps	
	100BASE-TX (half-duplex) 100 Mbps	
	100BASE-TX (full-duplex) 200 Mbps	
	1000BASE-T (full-duplex) 2000 Mbps (actual rate limited by PCI bus)	
Environmental	Operating Temperature:	32° to 132° F (0° to 55° C)
	Operating Humidity:	85% at 131° F (55° C)
Management	WOL, PXE, DMI, WFM 2.0	

Intel Dual Band Wireless-N 7260 802.11 a/b/g/n (2x2) Wireless Network Interface Connection

Wireless LAN Standards	IEEE 802.11a/b/g/n
Interoperability	Wi-Fi certified (802.11 a/b/g/n WMM, WPA, WPA2 and WPS)
	Cisco Compatible Extensions Program compliant with Microsoft Windows 7, Windows Vista and XP.

Technical Specifications – Networking/Communication

	NOTE: WLAN supplier's client utility is required for Cisco Compatible Extensions support with Microsoft Windows XP. WLAN may also be compatible with certain third-party software supplicants. WLAN supplier IHV extensions required for Cisco Compatible Extensions support for Microsoft Windows Vista.	
Frequency Band	802.11b/g/n	2.402-2.482 GHz
	802.11a/n	4.9 - 4.95 GHz (Japan) 5.15 - 5.25 GHz 5.25 - 5.35 GHz 5.47 - 5.725 GHz 5.825 - 5.850 GHz
Antenna Structure	2 transmit; 2 receive (2x2)	
Data Rates	802.11a: 6, 9, 12, 18, 24, 36, 48, 54 Mbps 802.11b: 1, 2, 5.5, 11 Mbps 802.11g: 6, 9, 12, 18, 24, 36, 48, 54 Mbps 802.11n: MCS 0 ~ MCS 15, (20MHz, and 40MHz)	
Modulation	Direct Sequence Spread Spectrum CCK, BPSK, QPSK, 16-QAM, 64-QAM	
Security	• IEEE and WiFi compliant 64 / 128 bit WEP encryption for a/b/g mode only • AES-CCMP: 128 bit in hardware • 802.1x authentication • WPA, WPA2: 802.1x. WPA-PSK, WPA2-PSK, TKIP, and AES. • WPA2 certification • IEEE 802.11i • Cisco Certified Extensions, all versions through CCX4 and CCX Lite • WAPI	
	Note: Check latest software/driver release for updates on supported security features.	
Sub-channels	Multinational support with frequency bands and channels compliant to local regulations.	
Network Architecture Models	Ad-hoc (Peer to Peer) Infrastructure (Access Point Required)	
Roaming	IEEE 802.11 compliant roaming between band Access Points	
Output Power	• 2.4G: +13.5dBm minimum • 5G: +12dBm minimum	
	Note: Maximum output power may vary by country according to local regulations.	
Power Consumption	Transmit: 2.0 Watts	
	Receive: 1.6 Watts	
	Idle mode: 250 mW (WLAN associated) In Power Save Polling mode and on battery power.	
	Idle mode: 100 mW (WLAN unassociated)	
	Radio off: 100 mW (WLAN unassociated)	

Technical Specifications – Networking/Communication

Power Management	ACPI compliant power management 802.11 compliant power saving mode	
Receiver Sensitivity Note: Receiver sensitivity is measured at a packet error rate of 8% for 802.11b (CCK modulation) and a packet error rate of 10% for 802.11a/g (OFDM modulation).	802.11g:-90 dBm (6 Mbps), -89 dBm (9 Mbps), -87 dBm (12 Mbps), -85 dBm (18 Mbps), -82 dBm (24 Mbps), -79 dBm (36 Mbps), -76 dBm (48 Mbps), -74 dBm (54 Mbps) 802.11b:-95 dBm (1 Mbps), -93 dBm (2 Mbps), -91 dBm (5.5 Mbps), -88 dBm (11 Mbps) 802.11g:-90 dBm (6 Mbps), -89 dBm (9 Mbps), -87 dBm (12 Mbps), -85 dBm (18 Mbps), -82 dBm (24 Mbps), -79 dBm (36 Mbps), -76 dBm (48 Mbps), -74 dBm (54 Mbps)	
Antenna Connections	2 U.FL type connectors (output impedance of 50 ± 2 ohms)	
Form Factors	PCI-Express Half-MiniCard	
Weight	0.0068 lb (3.1 g)	
Dimensions	0.12 x 1.06 x 1.18 in (3.1 x 26.8 x 30.0 mm)	
Operating Voltage	3.3V +/- 9%	
Temperature	**Operating:** **Non-operating:**	14° to 158° F (-10° to 70° C) -40° to 176° F (-40° to 80° C)
Humidity	**Operating:** **Non-operating:**	10% to 90% (non-condensing) 5% to 90% (non-condensing)
Altitude	**Operating:** **Non-operating:**	0 to 10,000 ft (3,048 m) 0 to 50,000 ft (15,240 m)
LED Activity	LED Amber - Radio OFF; LED White - Radio ON	

HP WLAN 802.11 a/b/g/n 2x2 Dual Band PCIe x1 WLAN/Bluetooth Card

Wireless LAN Standards	IEEE 802.11a/b/g/n	
Interoperability	Wi-Fi certification	
	BQE certification of the Bluetooth component	
	CCXv1, v2, v3, v4, v5 CCX certified (Cisco Client Extensions)	
	NOTE: WLAN supplier's client utility is required for Cisco Compatible Extensions support with Microsoft Windows XP. WLAN may also be compatible with certain third-party software supplicants. WLAN supplier IHV extensions required for Cisco Compatible Extensions support for Microsoft Windows Vista.	
Frequency Band	802.11b/g/n	2.402-2.482 GHz
	802.11a/n	4.9 - 4.95 GHz (Japan) 5.15 - 5.25 GHz 5.25 - 5.35 GHz 5.47 - 5.725 GHz 5.825 - 5.850 GHz
Antenna Structure	2 transmit; 2 receive (2x2)	

Technical Specifications – Networking/Communication

	Two embedded dual band 2.4/5 GHz antennas are provided to the card to support WLAN MIMO communications and Bluetooth communications.
Data Rates	• 802.11b: 1, 2, 5.5, 11 Mbps • 802.11g: 6, 9, 12, 18, 24, 36, 48, 54 Mbps • 802.11a: 6, 9, 12, 18, 24, 36, 48, 54 Mbps • 802.11n: card will support rates for NSS=1 and NSS=2 for RX and TX for 20 and 40 MHz channels. Short and long guard interval shall be supported.
Security	• IEEE and WiFi compliant 64 / 128 bit WEP encryption for a/b/g mode only • AES-CCMP: 128 bit in hardware • 802.1x authentication • WPA, WPA2: 802.1x. WPA-PSK, WPA2-PSK, TKIP, and AES. • WPA2 certification • IEEE 802.11i • Cisco Certified Extensions, all versions through V5 • WAPI
	Note: Check latest software/driver release for updates on supported security features.
Roaming	IEEE 802.11 compliant roaming between band Access Points
Output Power	• +13.5 dBm minimum • Maximum output power must be able to achieve modular regulatory certification peak gain of +3dBi at 2.4GHz and +5dBi at 5GHz
	Note: Maximum output power may vary by country according to local regulations.
Power Consumption	Transmit: 2.0 Watts
	Receive: 1.6 Watts
	Idle mode: 250 mW (WLAN associated)
	Idle mode: 100 mW (WLAN unassociated)
	Radio off: 75 mW (WLAN unassociated)
Bluetooth Power Consumption	Peak operating: 330 mW
	Receive: 230 mW
	USB selective suspend: 17 mW
Power Management	ACPI and PCI Express bus compliant power management 802.11 compliant power saving mode Supports USB selective suspend and resume of the Bluetooth component through the USB control signals.
Receiver Sensitivity	802.11b

Sensitivity (dBm)	Rate (Mbps)	Modulation and Coding Rate
-95	1	BPSK
-93	2	QPSK
-91	5.5	CCK

Technical Specifications – Networking/Communication

	<table><tr><td>-88</td><td>11</td><td>CCK</td></tr></table>
	802.11a/g <table><tr><td>Sensitivity (dBm)</td><td>Rate (Mbps)</td><td>Modulation and Coding Rate</td></tr><tr><td>-90</td><td>6</td><td>BPSK - ½</td></tr><tr><td>-89</td><td>9</td><td>BPSK – ¾</td></tr><tr><td>-87</td><td>12</td><td>QPSK – ½</td></tr><tr><td>-85</td><td>18</td><td>QPSK – ¾</td></tr><tr><td>-82</td><td>24</td><td>16 QAM – ½</td></tr><tr><td>-79</td><td>36</td><td>16 QAM – ¾</td></tr><tr><td>-76</td><td>48</td><td>64 QAM – 2/3</td></tr><tr><td>-74</td><td>54</td><td>64 QAM – ¾</td></tr></table>
	802.11n <table><tr><td>Sensitivity (dBm)</td><td>Rate (Mbps)</td><td>Modulation and Coding Rate</td></tr><tr><td>-69</td><td>150</td><td>64 QAM – 5/6</td></tr><tr><td>-66</td><td>300</td><td>64 QAM – 5/6</td></tr></table>
Form Factors	PCI-Express Half-MiniCard
Weight	0.1133 oz (3.212 g)
Dimensions	1.04 x 1.17 x 0.042 in (26.65 x 29.85 x 1.067 mm)
Operating Voltage	3.3V +/- 9%
Temperature	**Operating:** **Non-operating:**
	14° to 158° F (-10° to 70° C) -40° to 176° F (-40° to 80° C)
Humidity	**Operating:** **Non-operating:**
	10% to 90% (non-condensing) 5% to 95% (non-condensing)
Altitude	**Operating:** **Non-operating:**
	0 to 10,000 ft (3,048 m) 0 to 50,000 ft (15,240 m)

High Definition Audio

Type	Integrated
HD Stereo Codec	Realtek 2-channel ALC221 codec
Audio I/O Ports	Front microphone-In (150-K ohm Input Impedance)
	Rear Line-In/Microphone input (150-K ohm Input Impedance, function is configurable by audio driver)
	Rear Line-Out* (190 ohms Output Impedance, expects at least a 10-K ohm load)
	Front Headphone-Out (0.5 Ohm Output Impedance, expects at least a 32 ohm load) Front Microphone/Headphone jack is re-task able to provide Microphone input, line-in or Headphone output to support connecting two headphones to the front of the system. When configured as a second front headphone output, both front headphone outputs are always driven with the same signal.

Technical Specifications - Audio

	All ports are 3.5mm
Internal Speaker Amplifier	1.5W amplifier for the internal speaker only. External speakers must be powered externally.
Multi-streaming Capable	Multi-streaming can be enabled in the Realtek control panel to allow independent audio streams to be sent to/from the front and rear jacks.
Sampling	8 kHz - 192 kHz
Wavetable Syntheses	Yes – Uses OS soft wavetable
Analog Audio	Yes
# of Channels on Line-Out	Stereo (Left & Right channels)
Internal Speaker	Yes
External Speaker Jack	Yes

Technical Specifications - Input/Output Devices

HP USB Keyboard		
Physical characteristics	Keys	104, 105, 106, 107, 109 layout (depending upon country)
	Dimensions (L x W x H)	18.12 x 6.47 x 0.96 in (46.03 x 16.43 x 2.44 cm)
	Weight	2 lb (0.9 kg)
Electrical	Operating voltage	+ 5VDC ± 5%
	Power consumption	50-mA maximum (with three LEDs ON)
	System interface	USB Type A plug connector
	ESD	CE level 4, 15-kV air discharge
	EMI - RFI	Conforms to FCC rules for a Class B computing device
	Microsoft® PC 99 - 2001	Functionally compliant
Mechanical	Keycaps	Low-profile design
	Switch actuation	55-g nominal peak force with tactile feedback
	Switch life	20 million keystrokes (using Hasco modified tester)
	Switch type	Contamination-resistant switch membrane
	Key-leveling mechanisms	For all double-wide and greater-length keys
	Cable length	6 ft (1.8 m)
	Microsoft PC 99 - 2001	Mechanically compliant
Environmental	Acoustics	43-dBA maximum sound pressure level
	Operating temperature	50° to 122° F (10° to 50° C)
	Non-operating temperature	-22° to 140° F (-30° to 60° C)
	Operating humidity	10% to 90% (non-condensing at ambient)
	Non-operating humidity	20% to 80% (non-condensing at ambient)
	Operating shock	40 g, six surfaces
	Non-operating shock	80 g, six surfaces
	Operating vibration	2-g peak acceleration

Technical Specifications - Input/Output Devices

	Non-operating vibration	4-g peak acceleration
	Drop (out of box)	26 in (66 cm) on carpet, six-drop sequence
	Drop (in box)	30 in (76.2 cm) on concrete, 16-drop sequence
Approvals	UL, CSA, FCC, CE Mark, TUV, TUV GS, VCCI, BSMI, C-Tick, KC	
Ergonomic compliance	ANSI HFS 100, ISO 9241-4, and TUVGS	
Kit contents	Keyboard	Installation Guide
	Warranty Card	Safety and Comfort Guide

HP PS/2 Keyboard		
Physical Characteristics	Keys	104, 105, 106, 107, 109 layout (depending upon country)
	Dimensions (L x W x H)	18.22 x 6.47 x 1.1 in (46.28 x 16.43 x 2.79 cm)
	Weight	2 lb (0.9 kg) minimum
Electrical	Operating voltage	+ 5VDC ± 10%
	Power consumption	50-mA maximum (with three LEDs ON)
	System interface	PS/2 6-pin mini din connector
	ESD	CE level 4, 15-kV air discharge
	EMI - RFI	Conforms to FCC rules for a Class B computing device
	Microsoft PC 99 - 2001	Functionally compliant
	Keycaps	Low-profile design
	Switch actuation	55-g nominal peak force with tactile feedback
	Switch life	20 million keystrokes (using Hasco modified tester)
	Switch type	Contamination-resistant switch membrane
	Key-leveling mechanisms	For all double-wide and greater-length keys
	Cable length	6 ft (1.8 m)
	Microsoft PC 99 - 2001	Mechanically compliant
Environmental	Acoustics	50-dBA maximum sound pressure level

Technical Specifications - Input/Output Devices

	Operating temperature	32° to 104° F (0° to 40° C)
	Non-operating temperature	-22° to 149° F (-30° to 65° C)
	Operating humidity	15% to 80% (non-condensing at ambient)
	Non-operating humidity	15% to 90% (non-condensing at ambient)
	Operating shock	N/A
	Non-operating shock	65 inch 2.9 ms, six surface; 30g 266 inch/second; 50g 266 inch/second six surface
	Operating vibration	2-g peak acceleration
	Non-operating vibration	Starting at 5 Hz, vary the frequency of vibration from 5 to 500 Hz and back to 5 Hz at a Logarithmic sweep rate of 1 octave per minute.
	Drop (out of box)	26 in (66 cm) on carpet, six-drop sequence
	Drop (in box)	29.93 in (76 cm) on concrete, 16-drop sequence
Approvals	CUL, ICES-003 Class B, FCC, CE Mark,TUV GS, VCCI, BSMI, C-Tick, KC	
Ergonomic compliance	ANSI HFS 100, ISO 9241-4, and TUVGS	

HP USB Smart Card (CCID) Keyboard		
Key Benefits:	• Protects against unauthorized access with smart card technology • Delivers even greater security when combined with a HP ProtectTools smart card and the HP ProtectTools Security Software • Combination of username and password or pin with a smart card or security token • Secures online transactions using digital signatures and certificates • Conforms to industry standards for ease of setup and use • Delivers long product life and quiet operation with high-impact materials and lubricated keys • Spill drain feature	
Physical Characteristics	Keys	104, 105, 106, 107, 109 layout (depending upon country
	Form factor	USB basic smart card keyboard
	Colors	Carbonite/Silver
	Dimensions (H x W x D)	18.2 x 6.3 x 1.3 in (46.3 x 16.1 x 3.3 cm)
	Weight	2 lb (0.9 kg) minimum

Technical Specifications - Input/Output Devices

Electrical	Operating voltage	+ 5VDC ± 5%
	Power consumption	100-mA maximum (with four LEDs ON)
	System interface	USB Type A plug connector
	ESD	CE level 4, 15-kV air discharge
	EMI - RFI	Conforms to FCC rules for a Class B computing device
	Microsoft PC 99 - 2001	Functionally compliant
Mechanical	Languages	30+ available
	Keycaps	Standard design
	Switch actuation	55 g nominal peak force with tactile feedback
	Switch life	20 million keystrokes (using Hasco modified tester)
	Switch type	Contamination-resistant membrane
	Key-leveling mechanisms	For all double-wide and greater-length keys
	Cable length	6 ft (1.8 m)
	Microsoft PC 99 - 2001	Mechanically compliant
Environmental	Acoustics	43-dBA maximum sound pressure level
	Operating temperature	50° to 122° F (10° to 50° C)
	Non-operating temperature	-22° to 140° F (-30° to 60° C)
	Operating humidity	10% to 90% (non-condensing at ambient)
	Non-operating humidity	20% to 80% (non-condensing at ambient)
	Operating shock	40 g, six surfaces
	Non-operating shock	80 g, six surfaces
	Operating vibration	2-g peak acceleration
	Non-operating vibration	4-g peak acceleration
	Drop (out of box)	26 in (66 cm) on carpet, six-drop sequence
	Drop (in box)	42 in (107 cm) on concrete, 16-drop sequence
SmartCard Function	Support	All ISO 7816 smart cards (FIPS 201)

Technical Specifications - Input/Output Devices

	Interface	Reads from and writes to all ISO7816-1, 2, 3, 4 memory and microprocessor smart cards (T=0, T=1)	
	Chipset	SCM STCII	
	Standard APIs supported	PC/SC, EMV2000, SET	
	Power	USB Port	
		Short circuit detection (protects smart card and reader)	
		Power supply compliant with ISO7816 and EMV (5V, 60 mA)	
		Supports 3-V and 5-V cards	
	Power consumption	100-mA maximum draw	
	Communication	From card	9600 bps to 330,000 bps
		From computer	12 Mbps (USB transfer speed)
	Landing mechanism	Contact device	Friction contact
		Card insertions rating	Up to 100,000 insertion cycles
	Interface modes	CCID protocol	
	Reader performance interface	USB connection	
	Electro-magnetic standards	Europe	2004/108/EC
		USA	USAFCC part 15
Approvals	CE-Mark, UL, CSA, FCC, CE Mark, TUV, TUV GS, VCCI, BSMI, C-Tick, MIC, EMV2000, USB-IF		
Ergonomic Compliance	ISO 9241-4, TUVGS		
Kit Contents	Keyboard, I/O Security and Documentation CD, warranty card		

HP USB PS/2 Washable Keyboard

Physical Characteristics	Keys	104 (US) Layout, 105 (EU) layout – depending upon country
	Dimensions (L x W x H)	17.67x 6.62 x 1.38 in (449 x 168 x 35 mm)
	Weight	1.7 lb (0.77 kg) minimum
Electrical	Operating voltage	+ 5VDC ±5%
	Power consumption	50-mA maximum (with three LEDs ON)

Technical Specifications - Input/Output Devices

	System interface	USB Type A plug connector
	ESD	CE level 4, 15-kV air discharge
	EMI - RFI	Conforms to FCC rules for a Class B computing device
	Microsoft PC 99 - 2001	Functionally compliant
Mechanical	Keycaps	Stepped -profile design
	Switch actuation	55-g nominal peak force with tactile feedback
	Switch life	20 million keystrokes
	Switch type	Contamination-resistant switch membrane
	Key-leveling mechanisms	For all double-wide and greater-length keys
	Cable length	7 ft (2.2 m)
	Microsoft PC 99 - 2001	Mechanically compliant
	Acoustics	43-dBA maximum sound pressure level
Environmental	Operating temperature	50° to 122° F (10° to 50° C)
	Non-operating temperature	4° to 149° F (-20° to 65° C)
	Operating humidity	10% to 95% (non-condensing at ambient)
	Non-operating humidity	0% to 95% (non-condensing at ambient)
	Operating shock	40 g, six surfaces
	Non-operating shock	80 g, six surfaces
	Operating vibration	2-g peak acceleration
	Non-operating vibration	4-g peak acceleration
	Drop (out of box)	26 in (66 cm) on carpet, six-drop sequence
	Drop (in box)	42 in (107 cm) on concrete, 16-drop sequence
Operating system support	Windows 8, Windows 7, Windows Vista, Windows XP Professional	
Approvals	UL, cUL, FCC, CE, TUV GS, VCCI, BSMI, C-Tick, KCC, USB-IF, WHQL, EN/IEC 60601-1, IP66/NEMA4X	
Ergonomic compliance	ANSI HFS 100, ISO 9241-4, and TUVGS	

HP Wireless Keyboard and Mouse		
Keyboard	Dimensions (H x L x W)	1.09 x 18.1 x 6.47 in (27.87 x 460.3 x 164.3 mm)
	Weight – Without Two AA Alkaline Batteries	1.94 lb (880 g)
Mouse	Dimensions (H x L x W)	1.46 x 4.53 x 2.47 in (37 x 115 x 62.9 mm)
	Weight – Without Two AA Alkaline Batteries	0.15 lb (67 g)
Receiver	Dimensions (H x L x W)	0.33x 1.79 x 0.72 in (8.4 x 45.5 x 18.4 mm)
	Weight	0.21 oz (5.9 g)

Technical Specifications - Input/Output Devices

	Cable Length – Minimum	6 ft (1.8 m)
	Range	32.8 ft (10 m)
System Requirements	Windows 8, Windows 7 Professional Edition 32*, Windows 7 Professional Edition 64*, Windows Vista or Windows XP Available USB port for the receiver CD-ROM Drive * Not all features are available in all editions or versions of Windows. Systems may require upgraded and/or separately purchased hardware, drivers and/or software to take full advantage of Windows functionality. See http://www.microsoft.com.	
Approvals	Product Safety	UL; CSA /TUV (Europe only); CE Mark; CB Report
	Ergonomics	ANSI; ISO (Europe only); GS Mark (Germany only)
	EMC	FCC; CE; ACA (-tick); BSMI; KC ; VCCI
	CE Mark	EN 55022:2010; EN 55024; EN 301489-1; EN 61000
	Design Guidelines for PCs	PC 99 – connector overmold colors; PC 2001 – full functionality
	Telecom	All local telecom requirements and approvals for intended markets
	USA	FCC Title 47 CFR, Par 15, Subpart C; other local requirements
	Country Support	US, Belgium, Switzerland, Spain, Denmark, Netherlands, France, Germany, Italy, Portugal, Sweden, Norway, Finland, UK, Poland, Czech Republic, Turkey, Greece, Austria, Bulgaria, Cyprus, Estonia, Hungary, Ireland, Latvia, Lithuania, Luxemburg, Malta, Romania, Slovakia, Slovenia, Vietnam, HK, Australia, NZ, Malaysia, Singapore, Indonesia, Philippines, Thailand, Canada, China, Japan, Korea, Taiwan, India, Venezuela, Ecuador, Russia, Ukraine, Israel, Croatia, United Arab Emirates, Peru, Brazil, Chile, Argentina, Mexico, South Africa, and up to 193 countries worldwide.
Environmental	Keyboard contains 25% post-consumer recycled plastic material	

HP PS/2 Mouse		
Dimensions (H x L x W)	1.46 x 2.48 x 4.53 in (3.70 x 6.29 x 11.50 cm)	
Weight	3.53 oz (100g; +10g/- 5 g)	
Environmental	Operating temperature	-32° to 104°F (0° to 40° C)
	Non-operating temperature	-4° to 140°F (-20° to 60° C)

Technical Specifications - Input/Output Devices

	Operating humidity	10% to 90% (non condensing at ambient)
	Non-operating humidity	10% to 90% (non condensing at ambient)
	Operating shock	40 g, 6 surfaces
	Non-operating shock	80 g, 6 surfaces
	Operating vibration	2 g peak acceleration
	Non-operating vibration	4 g peak acceleration
	Drop (out of box)	80 cm height onto asphalt tile over concrete or equivalent, 5-drop in 5 direction except the cable face
Electrical	Operating voltage	5 VDC ± 10%
	Power consumption	100mA
	System consumption	PS/2 mini-din connector
	ESD	CE level 4, 15 kV air discharge
	EMI-RFI	Conforms to FCC rules for a Class B computing device
	Microsoft PC99 - 2001	Functionally compliant
Mechanical	Resolution	800 DPI
	Tracking speed	10 in/s (25.4 cm/s) maximum
	Acceleration	±15%
	Switch actuation	65±20 gf
	Switch life	3,000,000 operations (using Hasco modified tester)
	Switch type	Low force micro-switches
	Tracking mechanism life	80 km
	Cable length	6 ft (1.8 m)
	Microsoft PC99 - 2001	Mechanically compliant
Scroll wheel	Width	6 mm
	Diameter	22.5 ± 0.2 mm

Technical Specifications - Input/Output Devices

	Maximum rotation force	50 gf-cm
	Switch type	Light force micro-switch
	Switch life	1 million operations
	Mechanical life	Minimum 200,000 revolutions
Regulatory Approvals	UL/cUL, FCC, CE Mark, TUV/GS, VCCI, KCC, BSMI, C-Tick	

HP USB Mouse	
Dimensions (H x L x W)	1.5 x 4.5 x 2.5 in (3.7 x 11.5 x 6.3 cm)
Weight	0.22 lb (0.10 kg)
Cable length	70.9 in (180 cm)
System requirements	Available USB port

HP USB 1000dpi Laser Mouse		
Dimensions (H x L x W)	1.47 x 4.53 x 2.47 in (37.3 x 114.97 x 62.86 mm)	
Weight	3.360 oz (102g)	
Cable length	70.9 in (180 cm)	
System requirements	Available USB port	
Environmental	Operating Temperature	32° to 104° F (0° to 40° C)
	Non-operating Temperature	-4° to 140° F (-20° to 60° C)
	Operating Humidity	10% to 90% (non-condensing at ambient)
Mechanical	Resolution	1000dpi
	Tracking Speed	45 cm/sec
	Cable Length	70.9 in (180 cm)

Technical Specifications - Input/Output Devices

HP USB PS/2 Washable Mouse		
Dimensions (H x L x W)	1.56 x 2.44 x 4.61 in (3.95 x 6.21 x 11.7 cm)	
Weight	4.44 oz (126 g)	
Environmental	Operating temperature	–32° to 104°F (0° to 40° C)
	Non-operating temperature	–4° to 140°F (–20° to 60° C)
	Operating humidity	10% to 90% (non-condensing at ambient)
	Non-operating humidity	10% to 90% non-condensing
	Operating shock	40 g, 6 surfaces
	Non-operating shock	80 g, 6 surfaces
	Operating vibration	2 g peak acceleration
	Non-operating vibration	4 g peak acceleration
	Drop (out of box)	80 cm height onto asphalt tile over concrete or equivalent, 5-drop in 5 direction except the cable face
Electrical	Operating voltage	5 VDC ± 10%
	Power consumption	100mA
	System consumption	PS/2 mini-din connector or USB
	ESD	CE level 2 8 kV air discharge
	EMI-RFI	Conforms to FCC rules for a Class B computing device
	Microsoft PC99 - 2001	Functionally compliant
Mechanical	Resolution	1000 ± 20% DPI
	Tracking speed	14 in/s (35.56 cm/s) maximum

Technical Specifications - Input/Output Devices

	Acceleration	2 g
	Switch actuation	70 g nominal peak force
	Switch life	3,000,000 operations (using Hasco modified tester)
	Switch type	Low force micro-switches
	Tracking mechanism life	8.8 ft total 70 cm+ 2m extension
	Cable length	Mechanically compliant
	Microsoft PC99 - 2001	1000 ± 20% DPI
Scroll wheel	Width	6 mm
	Diameter	1 in (25.4 mm)
	Maximum rotation force	48 rats/sec
	Switch type	Light force micro-switch
	Switch life	3 million operations
	Mechanical life	Minimum 200,000 revolutions
Regulatory Approvals	FCC, CE Mark, ICES-003-B, IP66/NEMA4X	

Technical Specifications – Power

Unit Environment and Operating Conditions

General Unit Operating Guidelines

- Keep the computer away from excessive moisture, direct moisture and the extremes of heat and cold, to ensure that unit is operated within the specified operating range.
- Leave a 10.2 cm (4 in) clearance on all vented sides of the computer to permit the required airflow.
- Never restrict airflow into the computer by blocking any vents or air intakes.
- Do not stack computers on top of each other or place computers so near each other that they are subject to each other's re-circulated or preheated air.
- Occasionally clean the air vents on the front, back, and any other vented side of the computer. Lint, dust and other foreign matter can block the vents and limit the airflow.
- If the computer is to be operated within a separate enclosure, intake and exhaust ventilation must be provided on the enclosure, and the same operating guidelines listed above will still apply.

Temperature Range	Operating: 50° to 95° F (10° to 35° C)* Non-operating: –22° to 140° F(–30° to 60° C)
Relative Humidity	Operating: 10% to 90% (non-condensing at ambient) Non-operating: 5% to 95% (non-condensing at ambient)
Maximum Altitude (unpressurized)	Operating: 10,000 ft (3048 m) Non-operating: 30,000 ft (9144 m)

*Operating temperature is de-rated 1.0 deg C per 300 m (1000 ft) to 3000 m (10,000 ft) above sea level, no direct sustained sunlight. Maximum rate of change is 10 deg C/Hr. The upper limit may be limited by the type and number of options installed.

Power Supply

Standard Efficiency	180W active PFC (230 VAC input only) 180W Reg (115V/230Vac)
High Efficiency* 80 PLUS Bronze	180W active PFC EStar 6 82/85/82% efficient at 20/50/100% load (115V) 82/85/82% efficient at 20/50/100% load (230V)
Operating Voltage Range	90 - 264 VAC
Rated Voltage Range	200 - 240 VAC (180W active PFC) 100 - 240 VAC (180W EStar 6) 115VAC/230VAC (180W Reg)
Rated Line Frequency	50/60 Hz
Operating Line Frequency	47 – 63 Hz
Rated Input Current	4A/200VAC, 8A/100VAC
Rated Input Current with Energy Efficient* Power Supply	~~4A~~ 6.3A/100VAC
Current Leakage (NFPA 99)	<900uA / 230Vac
Current Leakage with Energy Efficient *Power Supply	<600uA/230VAC
Power Supply Fan	80mm Fan
Power cord length	6.0 ft. (1.83 m)
External Power Adapter	
Dimensions	N/A
Total Cord Length	N/A

*High efficiency power supply is a requirement for ENERGY STAR® qualification in conjunction with a select range of processors and modules

Technical Specifications – Weights & Dimensions

Weights & Dimensions

(configured with 1 HDD & 1 ODD)

Chassis (W x H x D)	165 x 355 x 358.8 mm 6.49 x 13.976 x 14.126 in
System Volume	21.02L
System Weight*	5.8 kg 12.78 lb
Max Supported Weight (desktop orientation)	N/A
Tower Stand (H x W x D)	N/A
Packaged (H x W x D)	496 x 240 x 520 mm 19.53 x 9.45 x 20.47 in
Shipping Weight	Est. 8.372 kg (18.457 lb)
Palletization Profile	2 x 5 = 10 -units per layer 4-layer max. 40-units per pallet

Technical Specifications – Miscellaneous Features

Management Features

- Advanced Configuration and Power Management Interface (ACPI). Allows the system to wake from a low power mode. Controls system power consumption, making it possible to place individual cards and peripherals in a low-power or powered-off state without affecting other elements of the system.
- Dual State Power Button; acts as both an on/off button and a suspend-to-sleep button

Serviceability Features

- Dual colored power LED on front of computer to indicate either normal or fault condition
- Diagnostic LED Explanation Table:
  - Number of 1-second red LED blinks followed by a 2-second pause, then repeats:
    - 2 - processor thermal protection activated
    - 3 - processor not installed
    - 4 - power supply failure
    - 5 -- memory error
    - 6 - video error
    - 7 - PCA failure (ROM detected failure prior to video)
    - 8 - invalid ROM, boot block recovery mode
    - 9 - system not fetching code
    - 10 - system hang while loading an option ROM
- HP PC Hardware Diagnostics UEFI:
  - This utility enables hardware level testing outside the operating system on many components. The diagnostics can be invoked by pressing F2 at POST, and is available as a download from HP Support
- System/Emergency ROM
- Flash ROM
- CMOS Battery Holder for easy replacement
- Flash Recovery with Video Configuration Record Software
- 5 Aux Power LED on System PCA
- Processor ZIF Socket for easy Upgrade
- Over-Temp Warning on Screen (Requires IM Agents)
- Clear Password Jumper
- DIMM Connectors for easy Upgrade
- Clear CMOS Button
- NIC LEDs (integrated) (Green & Amber)
- Dual Color Power and HD LED - To Indicate Normal Operations and Fault Conditions
- Color coordinated cables and connectors
- Front power switch
- System memory can be upgraded without removing the system board or any internal components
- Hard Drive, CD & Diskette Removal
- Tool icon for easy Identification

Additional Features

	Description
Drive Lock	Implementation of the industry standard ATA Security feature set. When enabled, it prevents software access to user data on the drive until one or two user-defined passwords are provided.
	DPS Access through F10 Setup during Boot
	A diagnostic hard drive self test. It scans critical physical components and every sector of the hard drive for physical faults and then reports any faults to the user
Drive Protection System	Running independently of the operating system, it can be accessed through a Windows-based diagnostics utility or through the computer's setup procedure. It produces an evaluation on whether the hard drive is the source of the problem and needs to be replaced

Technical Specifications – Miscellaneous Features

	The system expands on the Self-Monitoring, Analysis, and Reporting Technology (SMART), a continuously running systems diagnostic that alerts the user to certain types of failures
SMART Technology (Self-Monitoring, Analysis and Reporting Technology)	Allows hard drives to monitor their own health and to raise flags if imminent failures were predicted
SMART I - Drive Failure Prediction	Predicts failures before they occur. Tracks fault prediction and failure indication parameters such as re-allocated sector count, spin retry count, calibration retry count
SMART II - Off-Line Data Collection	By avoiding actual hard drive failures, SMART hard drives act as "insurance" against unplanned user downtime and potential data loss from hard drive failure
SMART III - Off-Line Read Scanning with Defect Reallocation	IOEDC: I/O Error Detection Circuitry Detects errors in Read/Write buffers on HDD cache RAM
SMART IV - End-to-End CRC for hard drives	Interface in F10 setup provides confirmation of SMART IV support.

Environmental Data

Eco-Label Certifications & declarations

This product has received or is in the process of being certified to the following approvals and may be labeled with one or more of these marks:

- IT ECO declaration
- US ENERGY STAR®
- EPEAT <Gold> registered in the United States. See http://www.epeat.net for registration status in your country.

System Configuration

The configuration used for the Energy Consumption and Declared Noise Emissions data for the Desktop model is based on a typically configured PC featuring a hard disk drive, a high efficiency power supply, and a Microsoft Windows® operating system.

Energy Consumption (in accordance with US ENERGY STAR® test method)	**115VAC, 60Hz**	**230VAC, 50Hz**	**100VAC, 60Hz**
Normal Operation (Short idle)	16.81 W	16.88 W	16.50 W
Normal Operation (Long idle)	15.97 W	16.04 W	15.85 W
Sleep	0.91 W	1.02 W	0.90 W
Off	0.61 W	0.71 W	0.60 W

Note:
Energy efficiency data listed is for an ENERGY STAR® compliant product if offered within the model family . HP computers marked with the ENERGY STAR® Logo are compliant with the applicable U.S. Environmental Protection Agency (EPA) ENERGY STAR® specifications for computers. If a model family does not offer ENERGY STAR® compliant configurations, then energy efficiency data listed is for a typically configured PC featuring a hard disk drive, a high efficiency power supply, and a Microsoft Windows® operating system.

Heat Dissipation*	**115VAC, 60Hz**	**230VAC, 50Hz**	**100VAC, 60Hz**
Normal Operation (Short idle)	57 BTU/hr	58 BTU/hr	56 BTU/hr
Normal Operation (Long idle)	55 BTU/hr	55 BTU/hr	54 BTU/hr
Sleep	3 BTU/hr	3 BTU/hr	3 BTU/hr
Off	2 BTU/hr	2 BTU/hr	2 BTU/hr

*NOTE: Heat dissipation is calculated based on the measured watts, assuming the service level is attained for one hour.

Declared Noise Emissions (in accordance with ISO 7779 and ISO 9296)	Sound Power (L_{WAd}, bels)	Sound Pressure (L_{pAm}, decibels)
Typically Configured – Idle	3.5	26

Technical Specifications – Miscellaneous Features

Fixed Disk – Random writes	3.6	26

Longevity and Upgrading

This product can be upgraded, possibly extending its useful life by several years. Upgradeable features and/or components contained in the product may include:

- 6 USB ports
- 2 memory slots
- 1 Mini PCIe half-length slot
- 1 MXM 3.0 Type A - 35W slot
- 1 mSATA slot
- 1 2.5" internal bay supporting up to Two 2.5" hard drives (HDD/SSD/SED/SSHD)
- 1 5.25" external supporting optical drive

<edit list of features as required>

Spare parts are available throughout the warranty period and or for up to "5" years after the end of production.

Batteries

This battery(s) in this product comply with EU Directive 2006/66/EC

Batteries used in the product do not contain:
Mercury greater the1ppm by weight
Cadmium greater than 20ppm by weight

Battery size: CR2032 (coin cell)
Battery type: Lithium

Additional Information

- This product is in compliance with the Restrictions of Hazardous Substances (RoHS) directive - 2011/65/EC.
- This HP product is designed to comply with the Waste Electrical and Electronic Equipment (WEEE) Directive – 2002/96/EC.
- This product is in compliance with California Proposition 65 (State of California; Safe Drinking Water and Toxic Enforcement Act of 1986).
- This product is in compliance with the IEEE 1680 (EPEAT) standard at the <gold> level, see www.epeat.net
- Plastics parts weighing over 25 grams used in the product are marked per ISO11469 and ISO1043.
- This product contains 11.9% post-consumer recycled plastic (by wt.)
- This product is 90.6% recycle-able when properly disposed of at end of life.

Packaging Materials

External:	PAPER/Corrugated	1065 g
Internal:	PLASTIC/EPE-Expanded Polyethylene	260 g
	PLASTIC/Polyethylene low density	50 g

The plastic packaging material contains at least 7 % recycled content.
The corrugated paper packaging materials contains at least 25% recycled content.

Common to all Form Factors

Material Usage

This product does not contain any of the following substances in excess of regulatory limits (refer to the HP General Specification for the Environment at http://www.hp.com/hpinfo/globalcitizenship/environment/pdf/gse.pdf):

- Asbestos
- Certain Azo Colorants
- Certain Brominated Flame Retardants – may not be used as flame retardants in plastics

- Cadmium
- Chlorinated Hydrocarbons
- Chlorinated Paraffins
- Formaldehyde
- Halogenated Diphenyl Methanes
- Lead carbonates and sulfates
- Lead and Lead compounds
- Mercuric Oxide Batteries
- Nickel – finishes must not be used on the external surface designed to be frequently handled or carried by the user.
- Ozone Depleting Substances
- Polybrominated Biphenyls (PBBs)
- Polybrominated Biphenyl Ethers (PBBEs)
- Polybrominated Biphenyl Oxides (PBBOs)
- Polychlorinated Biphenyl (PCB)
- Polychlorinated Terphenyls (PCT)
- Polyvinyl Chloride (PVC) – except for wires and cables, and certain retail packaging has been voluntarily removed from most applications.
- Radioactive Substances
- Tributyl Tin (TBT), Triphenyl Tin (TPT), Tributyl Tin Oxide (TBTO)

Packaging Usage

HP follows these guidelines to decrease the environmental impact of product packaging:

- Eliminate the use of heavy metals such as lead, chromium, mercury and cadmium in packaging materials.
- Eliminate the use of ozone-depleting substances (ODS) in packaging materials.
- Design packaging materials for ease of disassembly.
- Maximize the use of post-consumer recycled content materials in packaging materials.
- Use readily recyclable packaging materials such as paper and corrugated materials.
- Reduce size and weight of packages to improve transportation fuel efficiency.
- Plastic packaging materials are marked according to ISO 11469 and DIN 6120 standards.

End-of-life Management and Recycling

Hewlett-Packard offers end-of-life HP product return and recycling programs in many geographic areas. To recycle your product, please go to: http://www.hp.com/go/reuse-recycle or contact your nearest HP sales office. Products returned to HP will be recycled, recovered or disposed of in a responsible manner.

The EU WEEE directive (2002/95/EC) requires manufacturers to provide treatment information for each product type for use by treatment facilities. This information (product disassembly instructions) is posted on the Hewlett Packard web site at: http://www.hp.com/go/recyclers. These instructions may be used by recyclers and other WEEE treatment facilities as well as HP OEM customers who integrate and re-sell HP equipment.

Technical Specifications – Miscellaneous Features

Hewlett-Packard Corporate Environmental Information	For more information about HP's commitment to the environment: Global Citizenship Report http://www.hp.com/hpinfo/globalcitizenship/gcreport/index.html Eco-label certifications: http://www8.hp.com/us/en/hp-information/environment/ecolabels.html ISO 14001 certificates: http://www.hp.com/hpinfo/globalcitizenship/environment/pdf/PC_GBU_Product_Design_ISO_14K_Certificate.pdf and http://www.hp.com/hpinfo/globalcitizenship/environment/pdf/cert.pdf

After-Market Options (availability may vary by region)

Business Monitors	Part Number
HP ProDisplay P191	C9E54AA
HP ProDisplay P201	C9F26AA
HP ProDisplay P221	C9E49AA
HP ProDisplay P17A	F4M97AA
HP ProDisplay P19A	D2W67AA
HP ProDisplay P231	E4S07AA
HP EliteDisplay E201	C9V73AA
HP EliteDisplay E221	C9V76AA
HP EliteDisplay E231	C9V75AA
HP EliteDisplay E190i	E4U30AA
HP EliteDisplay E241i	FOW81AA
HP EliteDisplay E271i	D7Z72AA
HP EliteDisplay E221c	D9E49AA
HP EliteDisplay S230tm	E4S03AA
HP L2206tm	B0L55AA

Communication Devices	Part Number
Intel Ethernet I210 – T1 Gbe NIC	E0X95AA
Intel 7260 802.11 a/b/g/n PCIe x1 WLAN Card	F2P07AA

Graphics Solutions	Part Number
AMD Radeon HD 8350 Graphics (PCIe x16)	E1C63AA
AMD Radeon HD 8490 Graphics Card	E1C64AA
Nvidia GeForce GT 630 Graphics Card*	B4J92AA
Nvidia NVS 310 Graphics (PCIe x16)	A7U59AA
Nvidia NVS 315 Graphics (PCIe x16)	E1C65AA
HP DisplayPort Cable Kit	VN567AA
HP DisplayPort To Dual Link DVI-D Adapter	NR078AA
HP DisplayPort To DVI-D Adapter	FH973AA
HP DisplayPort to HDMI Adapter	BP937AA
HP DisplayPort To HDMI 1.4 Adapter	K2K92AA
HP DisplayPort to VGA Adapter	AS615AA
HP DMS-59 to Dual DVI Cable	DL139A
HP DMS-59 to Dual DisplayPort Adapter	XP688AA
Dual Output USB Graphics Adapter	C5U89AA

Data Storage Drives and Accessories	Part Number
HP 1-TB 7.2K rpm SATA 6.0Gb/s 3.5” Hard Disk Drive	QK555AA
HP 1-TB 10K rpm SATA 6.0Gb/s 3.5” Hard Disk Drive	C2T91AA

After-Market Options (availability may vary by region)

HP 500-GB 7.2K rpm SATA 6.0Gb/s 3.5" Hard Disk Drive	QK554AA
Intel Pro 1500 180GB SATA SED Opal1 SSD	G4M04AA
HP 128-GB SATA 3.0Gb/s Solid State Drive	QV063AA
HP 500-GB SATA 3.0Gb/s Solid State Hybrid Drive	E1C62AA
HP Slim Removable SATA Hard Drive Enclosure (frame & carrier)	C1N41AA
HP Slim Removable SATA Hard Drive Enclosure (carrier only)	AR639AA

Input Devices

	Part Number
HP USB Keyboard	QY776AA
HP USB Gray Keyboard (EMEA only)	B6B64AA
HP USB Smart Card (CCID) Keyboard	E6D77AA
HP USB Keyboard and Mouse Kit	B1T09AA
HP USB and PS/2 Washable Keyboard and Mouse Kit	BU207AA
HP USB Grey Mouse	K7W54AA
HP PS/2 Mouse	QY775AA
HP USB Mouse	QY777AA
HP USB 1000dpi Laser Mouse	QY778AA
HP Wireless Keyboard and Mouse Combination	QY449AA
HP USB Antimicrobiall Keyboard and Mouse (China Only)	K7X25AA

System Memory

	Part Number
HP 4GB DDR3-1600 (PC3-12800) DIMM	B4U36AA
HP 8GB DDR3-1600 (PC3-12800) DIMM	B4U37AA

Multimedia Devices

	Part Number
HP Slim DVD-ROM Drive	VP033AA
HP Slim SuperMulti DVD Writer Drive	QS209AA
HP USB HD 720P v2 Business Webcam	D8Z08AA
HP Business Headset	QK550AA
HP Business Speakers	D9J19AA

Security Devices

	Part Number
HP UltraSlim Cable Lock	H4D73AA

Stands and Accessories

	Part Number
HP (10 Sets) 400 G2 Bezel Support Kit	TBD
HP Serial Port Adapter (RS-232 compatible)	PA716A
HP Parallel Port Kit	KD061AA

LANDesk Software (E-Delivery)

Contact your HP representative for available options.

After-Market Options (availability may vary by region)

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After-Market Options (availability may vary by region)

Summary of changes

Date of change:	Version History:		Description of change:
July 1, 2014	From v1.8 to v1.9	Addition	add environmental section above options
		Addition	Add the change log
July 17, 2014	From v1.9 to v2	Upgrade	Change the version so it would match the PB
September 30, 2014	From v2 to v4	Removed	" Trusted Platform Module" from Security section
		Added	Added under security "Trusted Platform Module,SLB9660TT1.2FW4.40 (TPM) 1.2 (Common Criteria EAL4+ certified)" added a new card to the networking/communications section, "Intel 7260 802.11 a/b/g/n PCIe x1 WLAN Card (optional)" Added a new section to the Networking communication "Intel 7260 802.11 a/b/g/n PCIe x1 WLAN Card *" Added new card to the Graphics and solutions section, "Nvidia GeForce GT 630 Graphics Card*"
October 06, 2014	From v4 to v5	Addition	Added the OS “Ubuntu Linux” to the Operating systems sections
October 23, 2014	From v5 to v6	Removed	Remove "HP PCI Expansion Kit - E1V16AA" from Stands and Accessories
November 3, 2014	From v6 to v7	Remove	Remove OS windows 7 Ultimate and Home
December 1, 2014	From v 7 to v8	Changes	Added Mouse gray under Input Devices Added two new drives under Solid State Drives page 5 Hard Disk and Solid State Storage added two new products Added HP 128 GB* (non-SED) TLC Solid State Drive HP 256 GB* (non-SED) TLC Solid State Drive Added new note for BAYS
January 28, 2015	From v8to v9	Addition	Under Adapters and cables HP DisplayPort To HDMI 1.4 Adapter 120GB SATA 2.5 Non-SED SSD (with 3.5” adapter when needed) 180GB SATA 2.5 Non-SED SSD (with 3.5” adapter when needed) 120GB SATA 2.5 Opal2 SED SSD (with 3.5” adapter when needed) 180GB SATA 2.5 Opal2 SED SSD (with 3.5” adapter when needed) under Keyboards and pointing devices HP USB Antimicrobial Keyboard HP USB Antimicrobial Mouse HP DisplayPort To HDMI 1.4 Adapter HP USB Antimicrobiall Keyboard and Mouse (China Only)
		Change	Value in Chassis Weigth to 165 x 355 x 358.8 mm 6.49 x 13.976 x 14.126 in Value for System Volume 21.02L
February 9, 2015	From v9 to v10	Change	Change values in Processors and Graphics